Milton Keynes Hospital NHS
NHS Foundation Trust

Glaucoma- A Basic Overview

Glaucoma Patient Support Group

October 2017

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GLAUCOMA PATIENT SUPPORT GROUP: 13th Oct 2017

Dear Patron,

Thank you for attending our Glaucoma Support Group meeting today.
We would sincerely value your feedback.

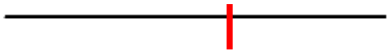
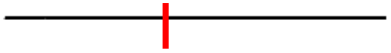
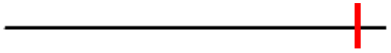
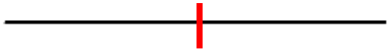
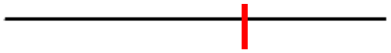
Please complete Section 1 BEFORE Presentations:

SECTION 1:

1) **How many times have you been to this Patient Support Group Meeting before today?** ***(please circle below)***

0 **1** **2** **3** **>3**

2) **Please indicate what best applies to you by putting a vertical mark on the line:**

How much do I know about:	**Nothing <----------> Everything** **0% 100%**	**Your Comments:**
A. My condition?		
B. The Treatment Options?		
C. Using Eye Drops?		
How Positive do I feel about:	**Negative <----------> Positive** **0% 100%**	
D. My Condition?		
E. My Glaucoma Care at MK?		

<<STOP HERE!>>

Please put aside and only complete the next sections **AFTER** the end of the presentations. **>>**

A Funny Story……

?

Overview

- Definitions
- Background Statistics
- Monitoring of Glaucoma
- Management & treatment
- Glaucoma and Driving
- Future Directions
- Glaucoma in perspective

What is Glaucoma?

Definitions

- What is Glaucoma?
  - Umbrella term for group of conditions resulting in progressive optic nerve damage and a characteristic pattern of corresponding visual field loss
- 2% of those >40 years old
- ‘Eye Pressure-sensitive’
- No ‘cure’ yet
- Progression slowed by reducing IOP from baseline / highest (by at least a third)

What is Ocular Hypertension?

Definitions

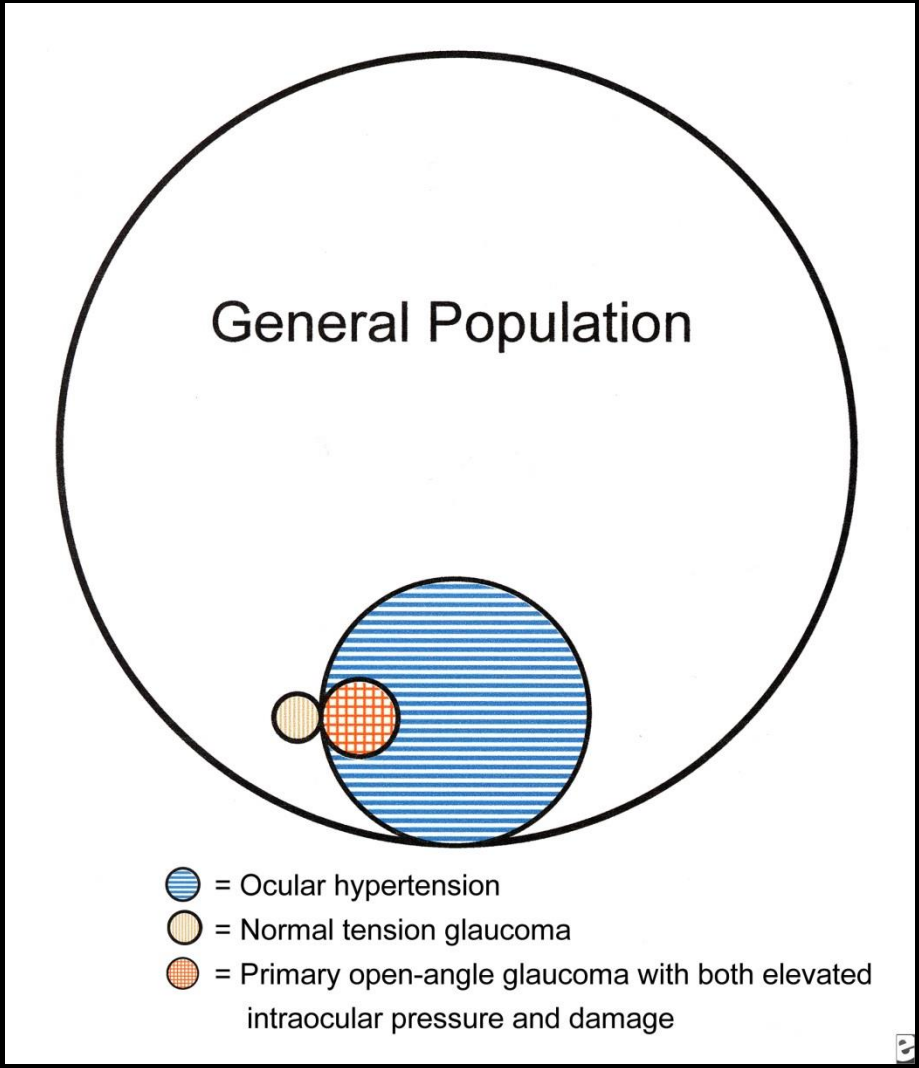
- ‘Normal’ Eye pressure 10 - 21 mmHg
- What is Ocular Hypertension (OHT)?
  - Higher than average IOP (>21mmHg) without any evidence for nerve damage or visual field loss
- Can convert to glaucoma (approx 10%)
- OHT Patients are often related to glaucoma patients
- Consider treating if IOP > 30mmHg

What is ‘Normal Tension’ glaucoma?

Definitions – Normal Tension Glaucoma

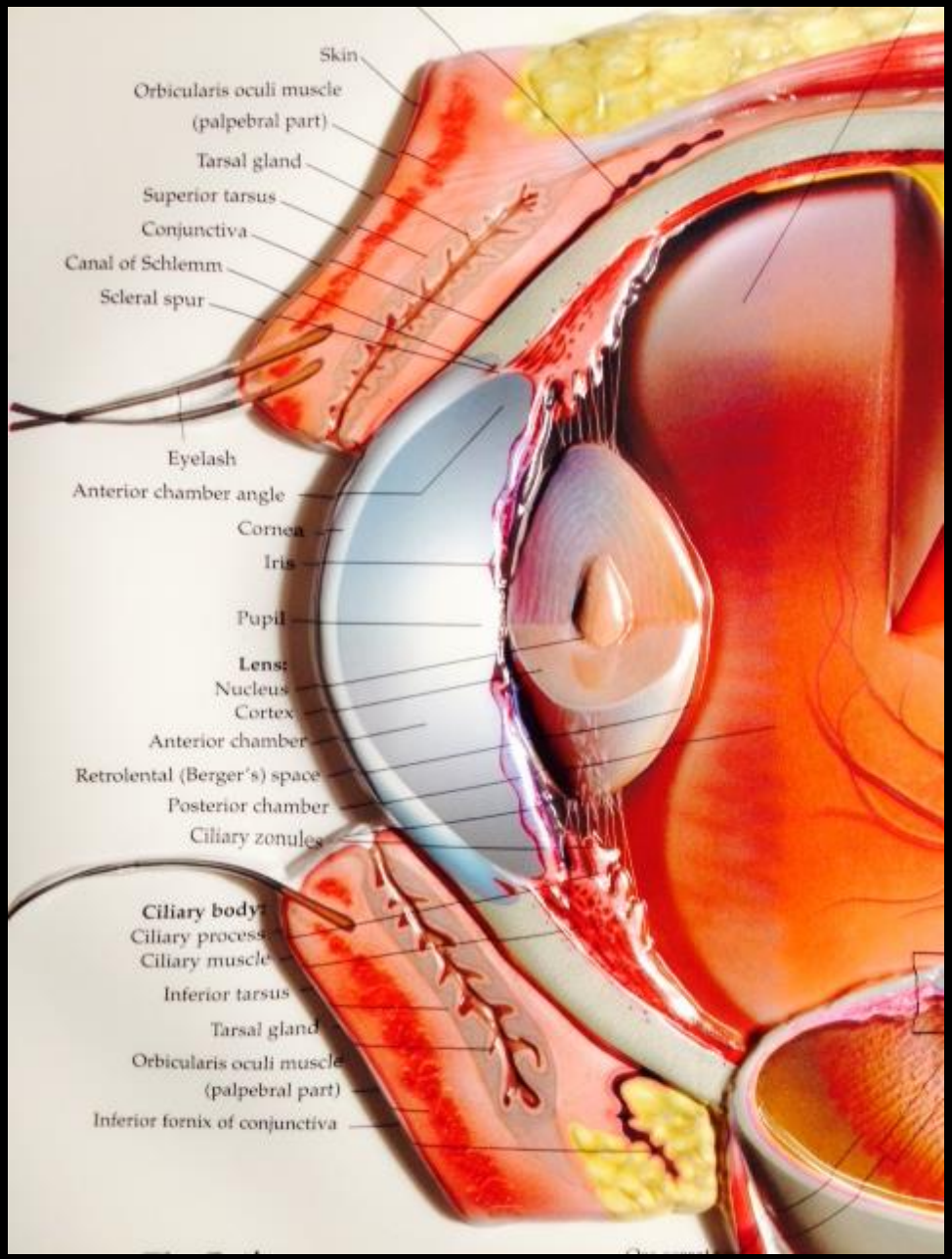
- ‘Normal’ Eye pressure (10 - 21 mmHg)
- NTG - Normal eye pressure but still getting progressive glaucoma
- Thought to be related to poor circulation or poor blood supply to optic nerve
- Association with migraine and low BP
- Still worth lowering eye pressure (reduces daily fluctuations)

Relative numbers of glaucoma and OHT



What is ‘Open angle’ and ‘Closed angle’ glaucoma?

Open Versus Closed angle



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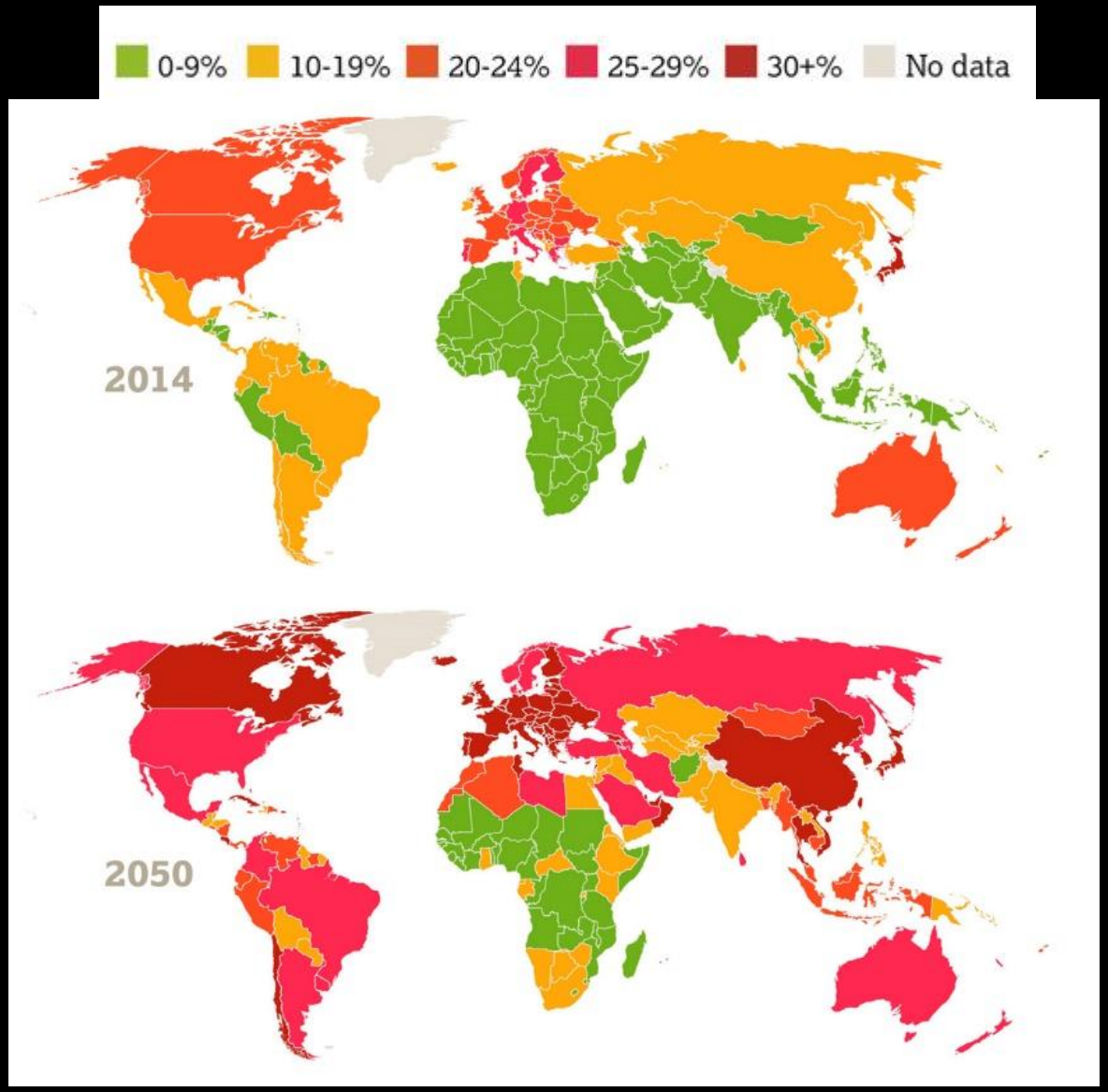
Why can glaucoma be missed?

- Usually no symptoms – central vision usually last to go
- Binocular compensation
- Prevent Blindness America Survey 2002
  - 50% heard of glaucoma but unsure what it was
  - 30% Never heard of glaucoma
  - 20% knew related to eye pressure (most thought it would have symptoms, could be easily cured and did not lead to blindness)

Background statistics

- Second biggest cause of blindness worldwide
- Ageing Population

Global Ageing – Number of people > 60 years)

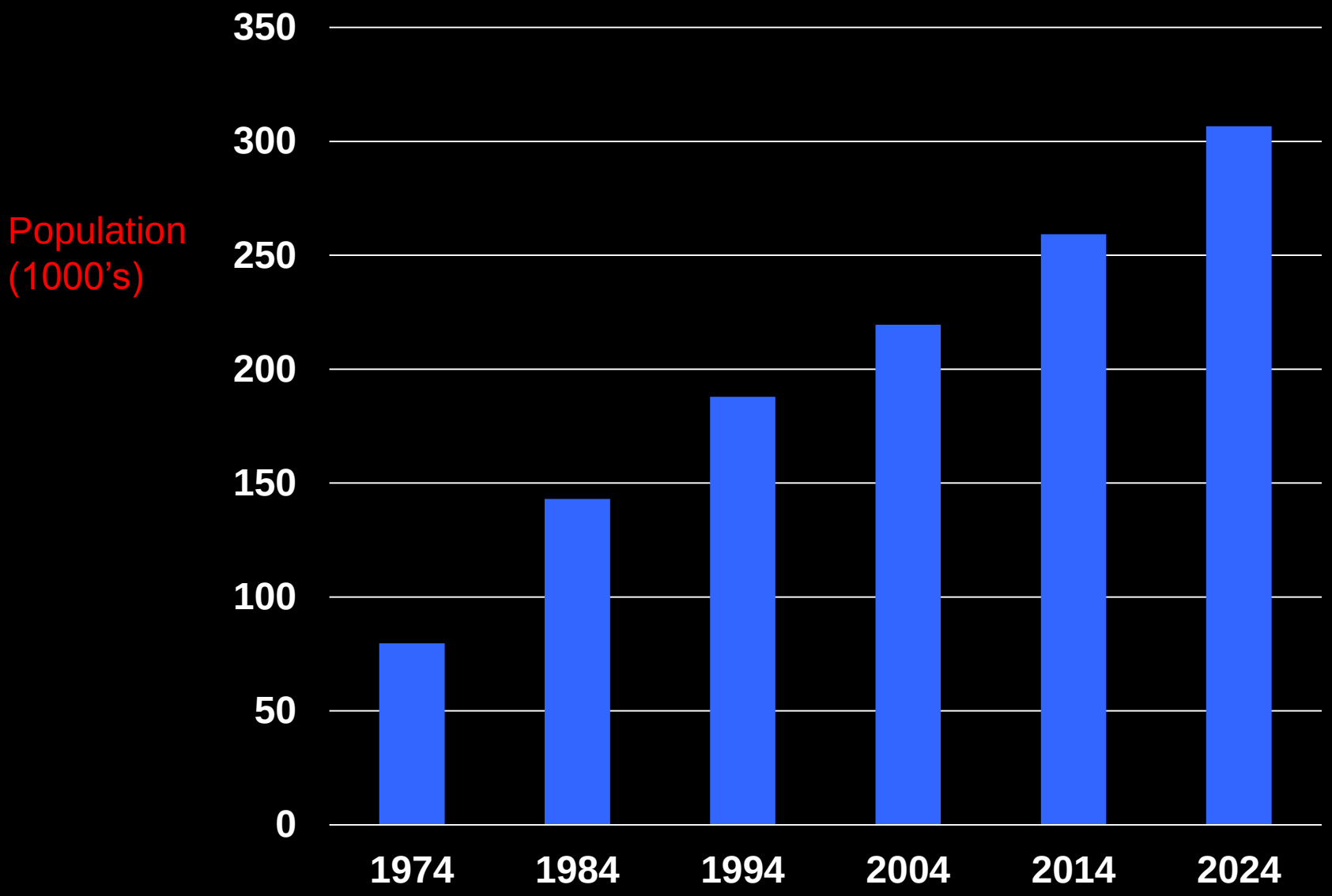


http://www.helpage.org/global-agewatch/population-ageing-data/population-ageing-map/

Background statistics

- Second biggest cause of blindness worldwide
- Ageing Population
- Variation in access to care;
  - Europe: 1 ophthalmologist / 10,000 population
  - India: 1 ophthalmologist / 400,000 population
  - Africa: 1 ophthalmologist / 1 million population
- Rapidly Growing Population of MK
  - Grown by 43,000 since 2001
  - 20.2% growth compared to 8.9% for England
- 76% of UK people would rather lose limb than their eyesight *(Fightforsight website)*

MK Population projections



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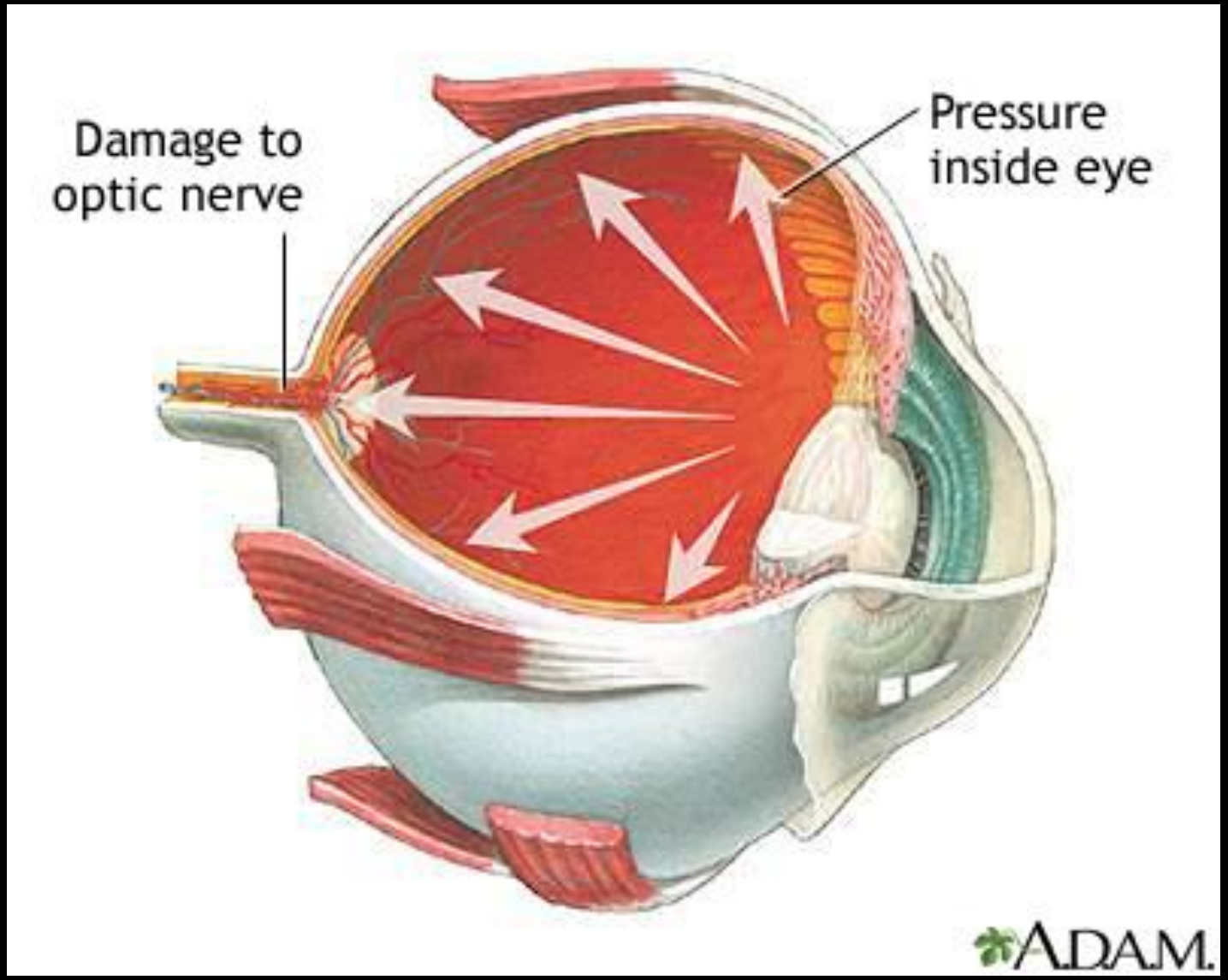
Monitoring of Glaucoma and OHT

- 1) Intraocular Pressure (IOP)
- 2) Optic Nerve Assessment (“Cupping”)
- 3) Visual Fields

Monitoring of Glaucoma & OHT:

1. Intraocular Pressure (IOP)



Monitoring of Glaucoma & OHT:
1. Intraocular Pressure (IOP)

- “normal” range 10-21mmHg (Caucasian Europeans)
- Up to 4mmHg difference between eyes normal. Abnormal > 8mmHg
- IOP very dynamic and variable
  - Diurnal variation (Highest early morning, >10mmHg variation abnormal)
  - Eye movements
  - Breathing Patterns
  - Physical activity
  - Supine vs sitting up
  - Seasonal variations (higher jan-feb and lowest in may-aug)

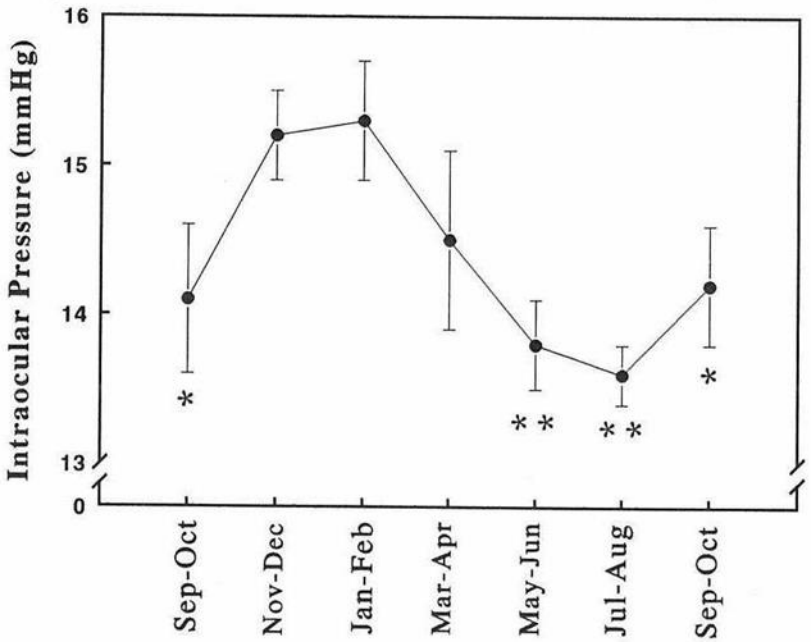


Figure The distribution of intraocular pressures for each two-month period. The symbol(●) represent the mean and the vertical lines, above and below the mean, represent one standard error of the mean. Decreases are significant (*$p < 0.02$; **$p < 0.001$) as compared to highest mean value in January and February.

Qureshi et al Korean J. Ophthal 1996 10:29-33

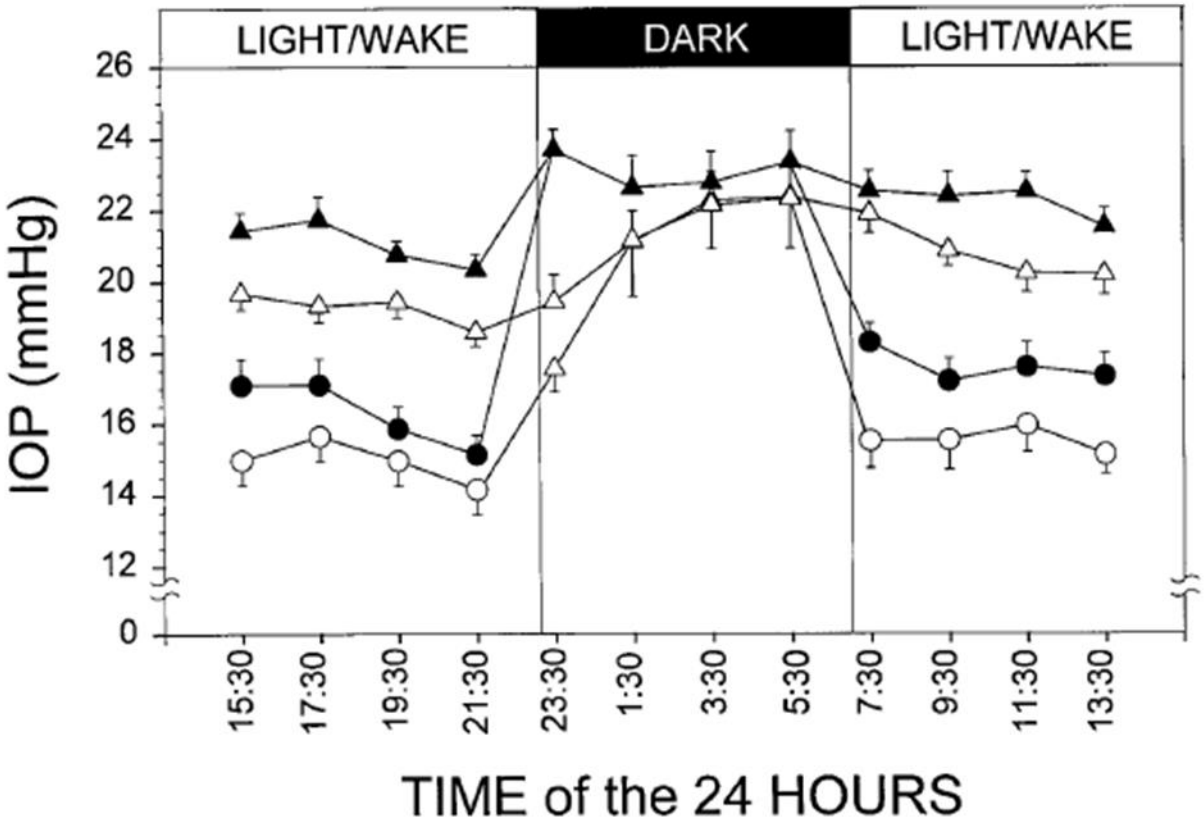
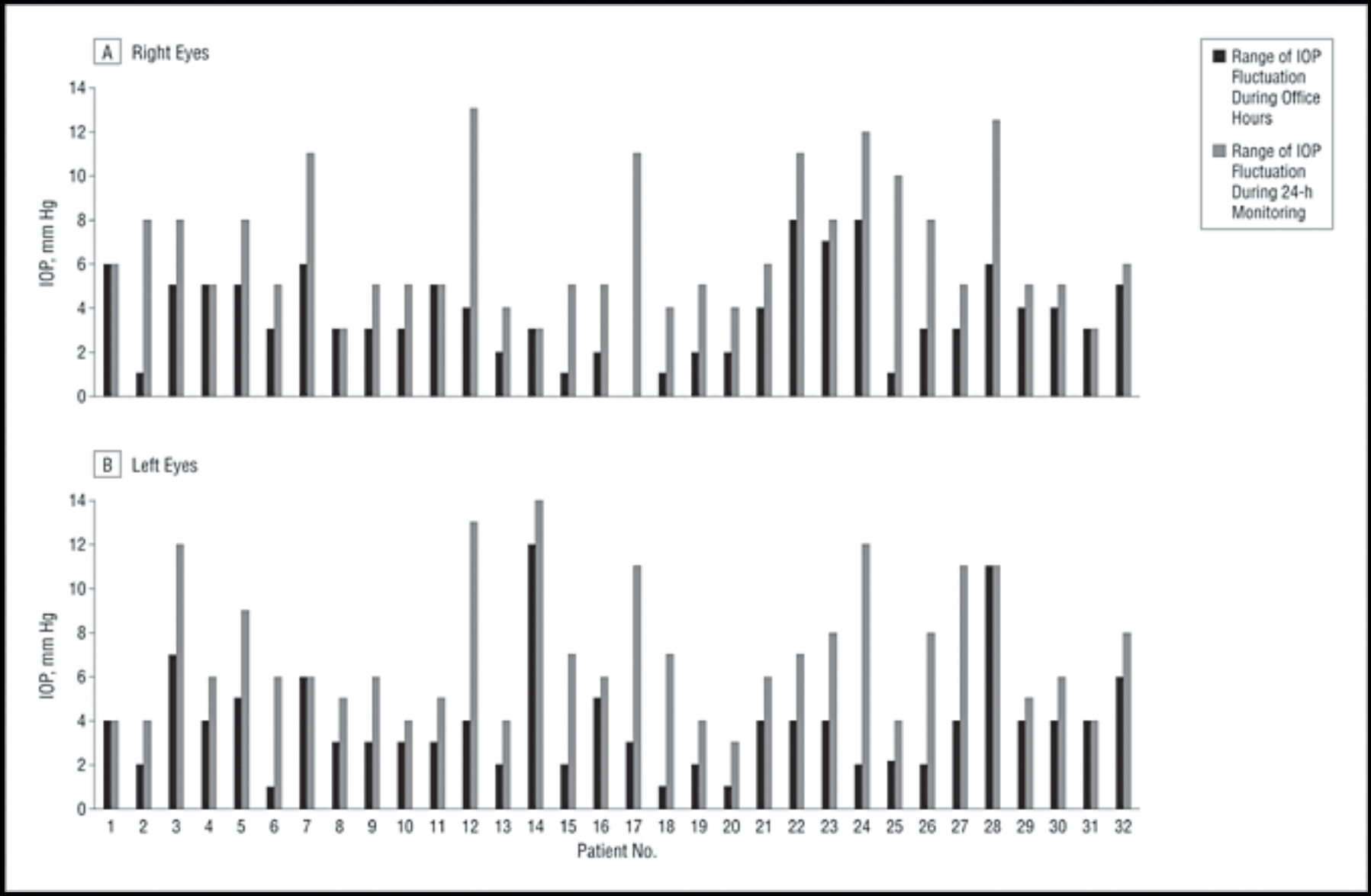


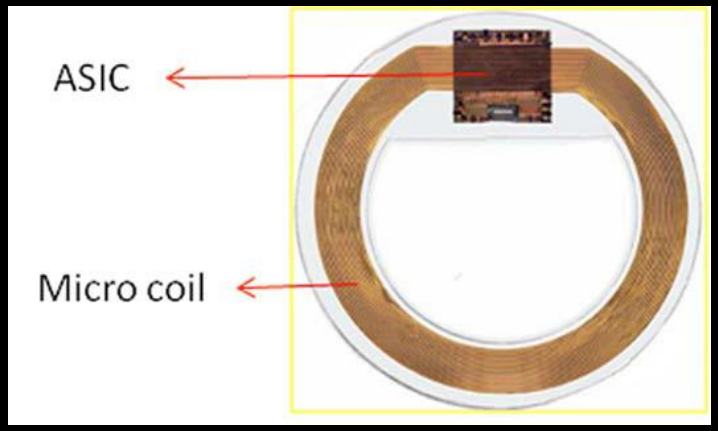
FIGURE 1. A comparison of 24-hour patterns of IOPs in the aging and the young volunteers. *Solid symbols* represent a group of 50- to 69-year-old volunteers (n = 21). Intraocular pressure was measured by a pneumatonometer 30 minutes after the odd hours in both the sitting (●) and the supine (▲) positions during the light/wake period (7 AM–11 PM) and only in the supine position during the dark period (11 PM–7 AM). Error bars represent SEM. Previously published results[6] from two separate groups of 18- to 25-year-old volunteers were included for comparison. In one group (n = 12), IOP was measured in the sitting position (○) during the light/wake period and in the other group (n = 21) in the supine position (△). During the dark period, all measurements of IOP were performed with subjects supine. Participants started 24-hour experiments at different times evenly distributed in the light/wake period.

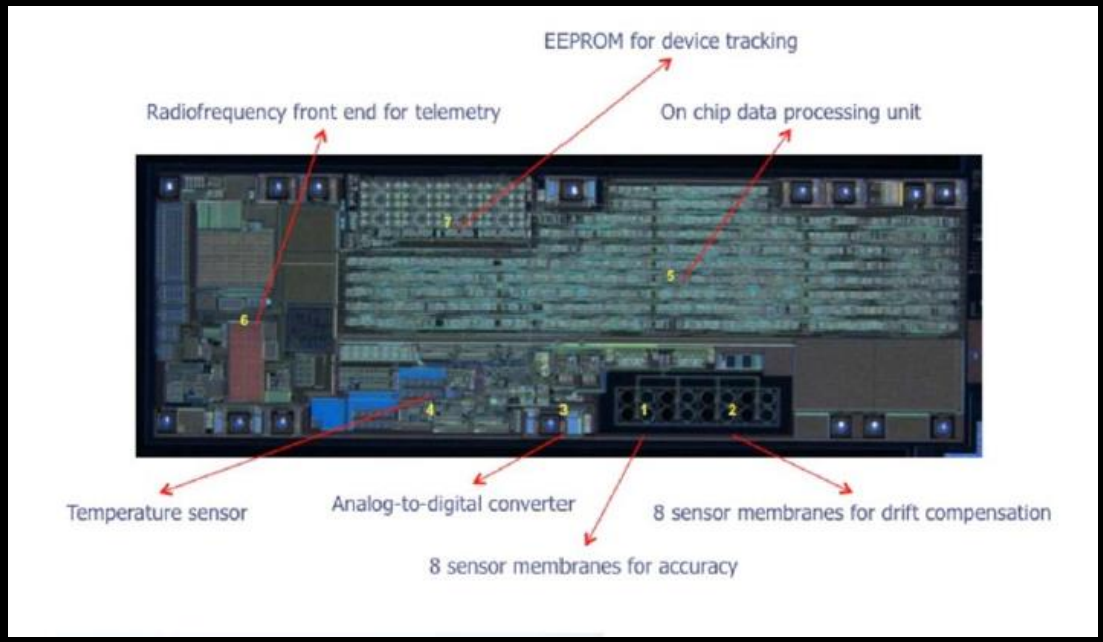
Liu et al, IOVS 1999 40:12

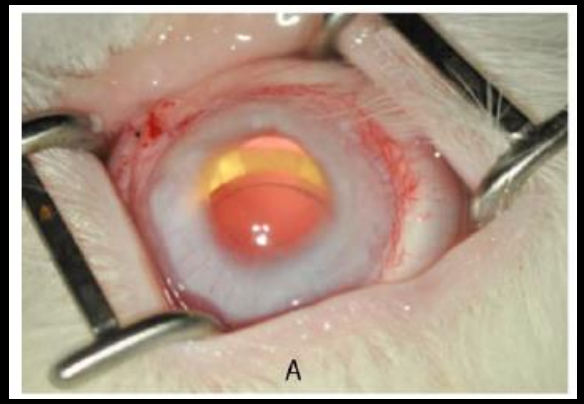


Barkana et al Arch Ophthalmol. 2006;124:793-797

Todani et al IOVS 2011

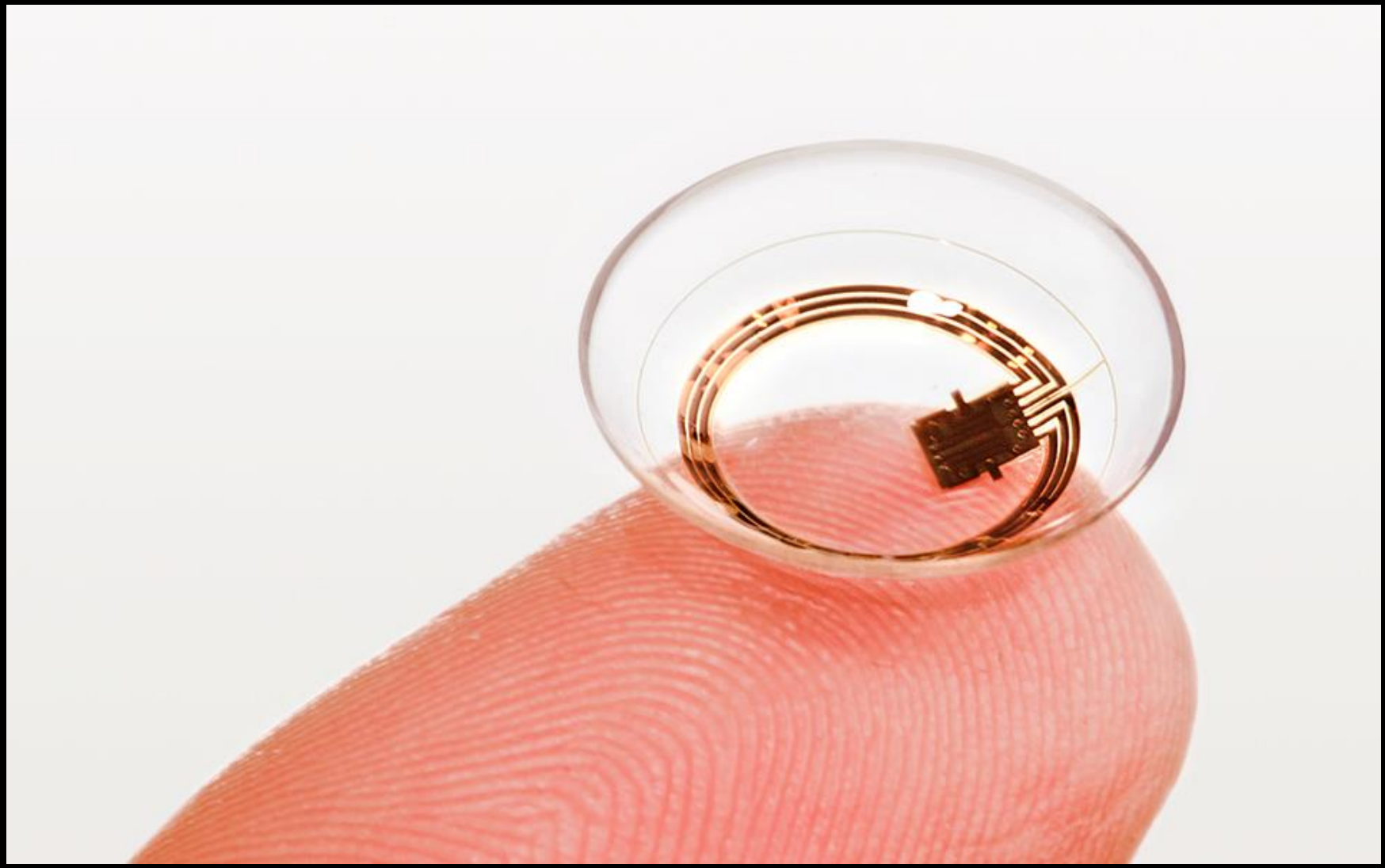


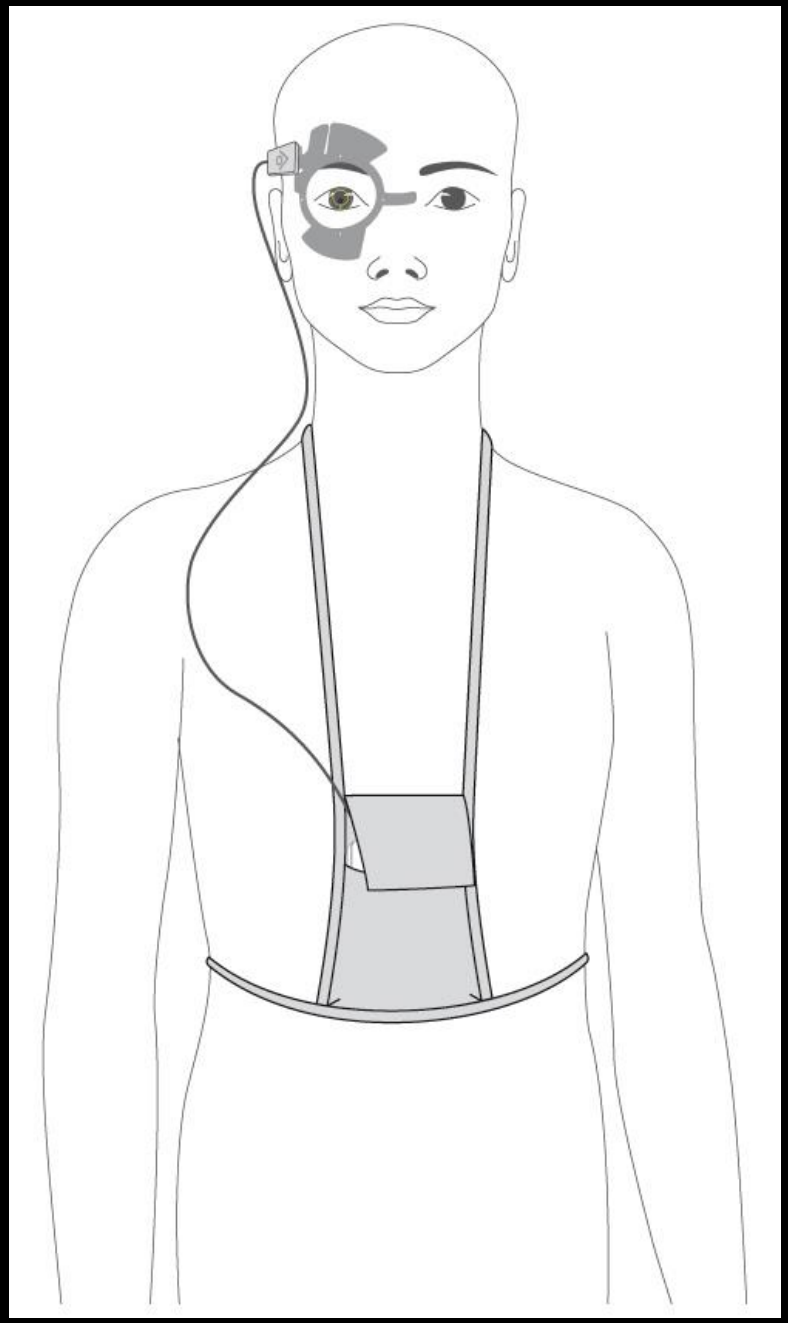




SENSIMED Triggerfish®

(Sensimed, Lusanne, Switzerland)





SENSIMED Triggerfish

Rev. 1.1.2.21:804

Last Name

Gender

Patient code

Date of Birth

First Name

Race

Eye

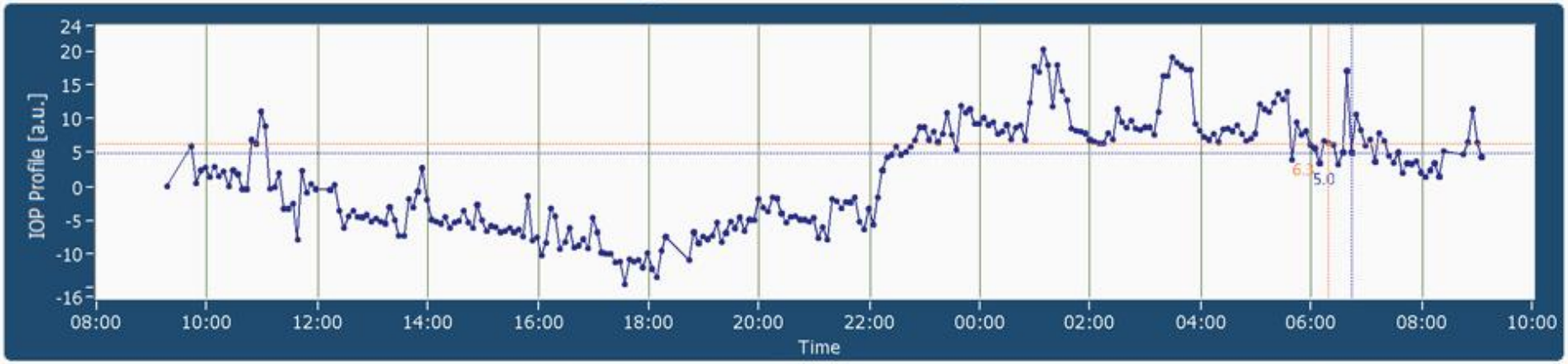
Sensor ID

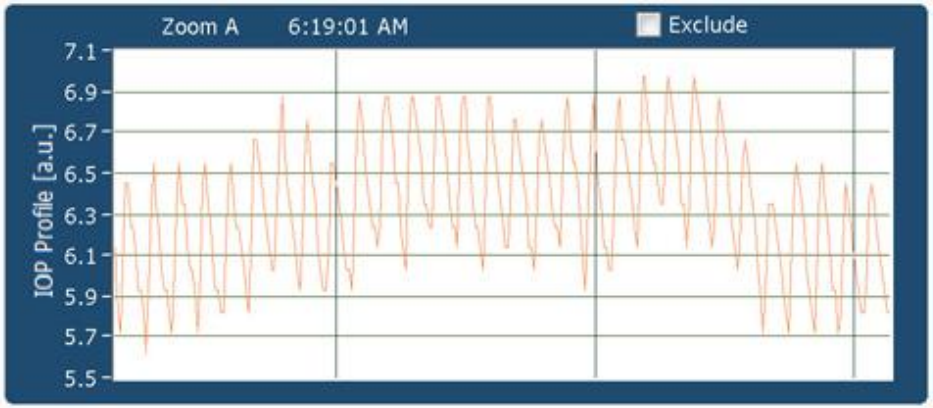
Monitoring Start

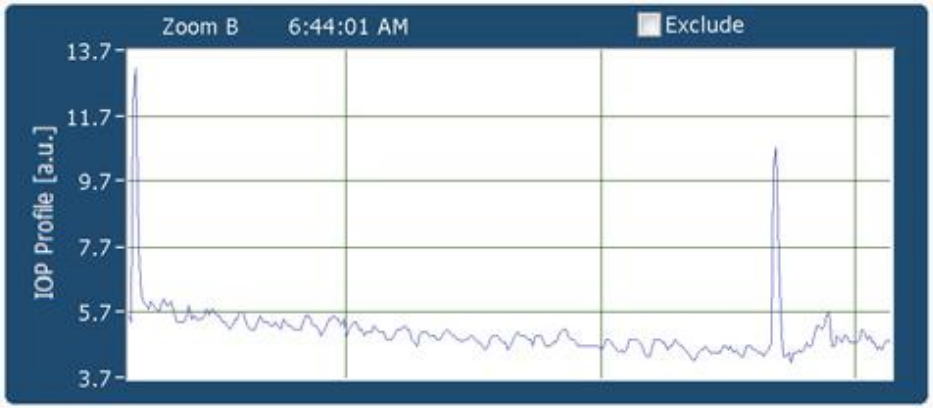
Monitoring End

Initial IOP [mmHg]

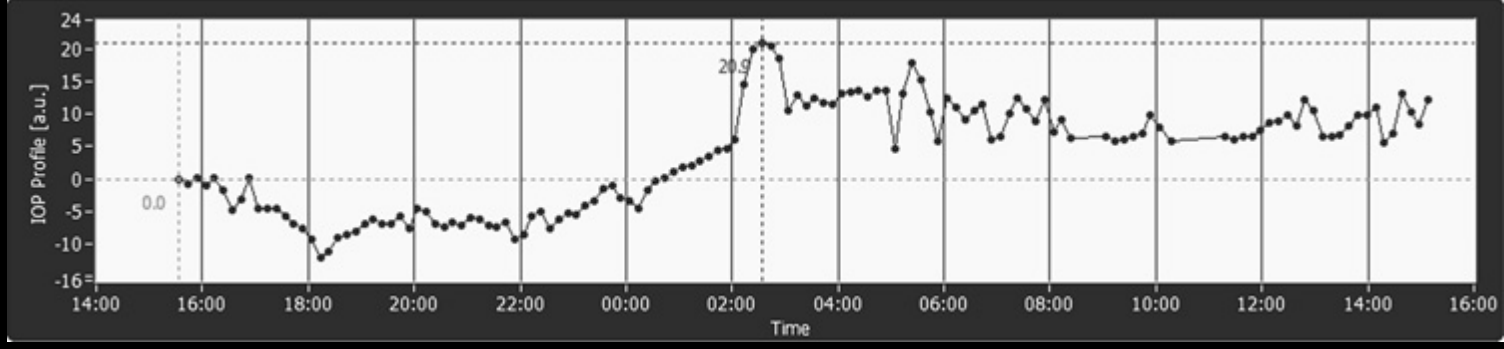
End IOP [mmHg]



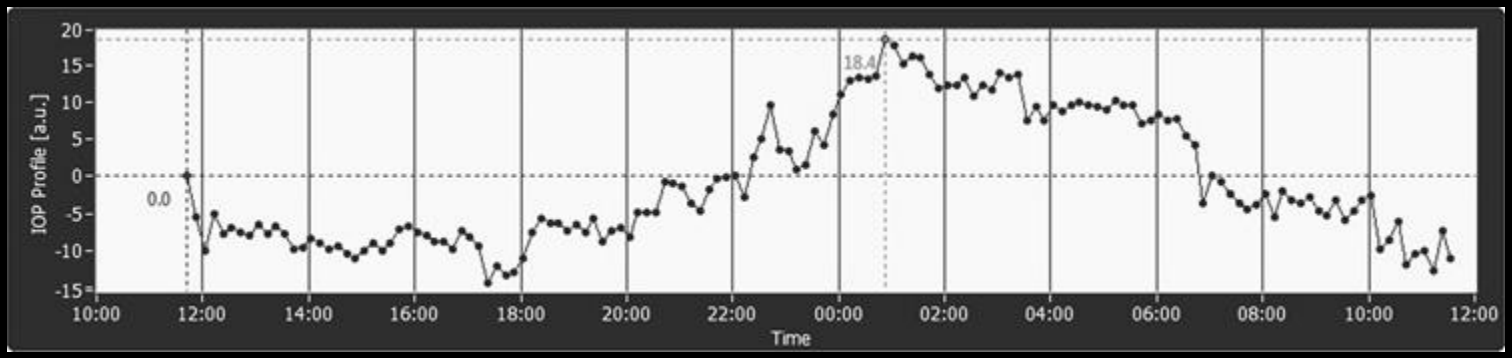




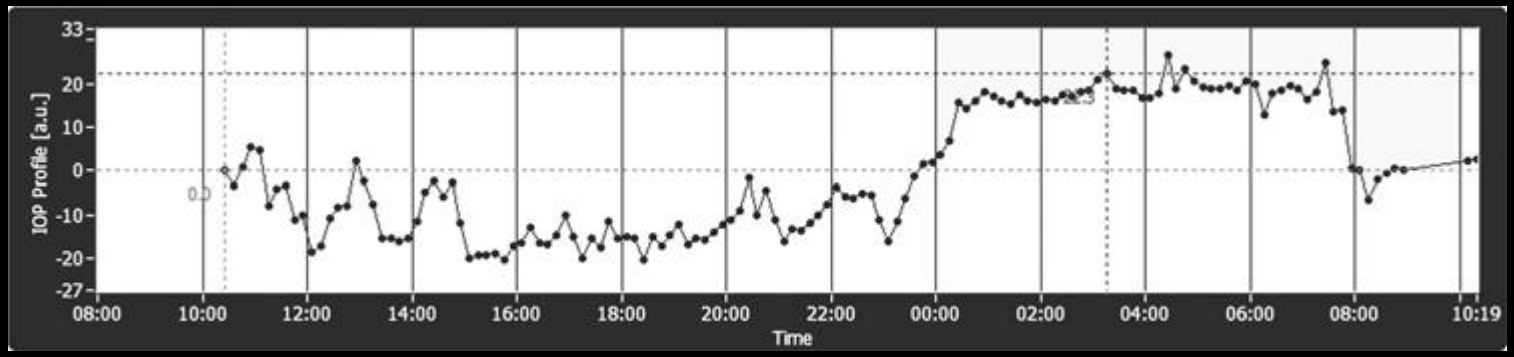
Mansouri & Shaarawy BJO 2011 95;627



60 y.o Male. POAG. Latanoprost at 22.00. GAT 13 at baseline, 15 after 24 hrs



79 y.o Female. POAG. Alphagan 9 & 17.30. Latanoprost at 22.00. GAT 14 at baseline, 16 after 24 hrs



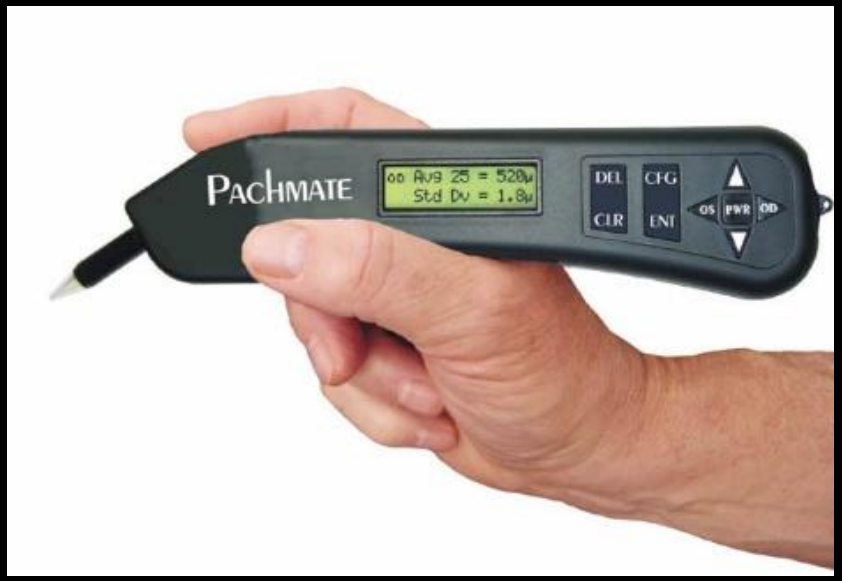
56 y.o Male. PXF. Latanoprost at 23.00. GAT 21 at baseline, 23 after 24 hrs

Change in therapy in 11/15 (73%) of patients.

Central Corneal Thickness (CCT)

(Influence on IOP measurement)

Corneal Thickness Measurement (Pachymetry)



Central Corneal Thickness (CCT)

- Independent risk factor for development of glaucoma
- Tendency to overestimation of IOP in thick corneas (>555um)
- Tendency to underestimation of IOP in thin corneas (<555um)

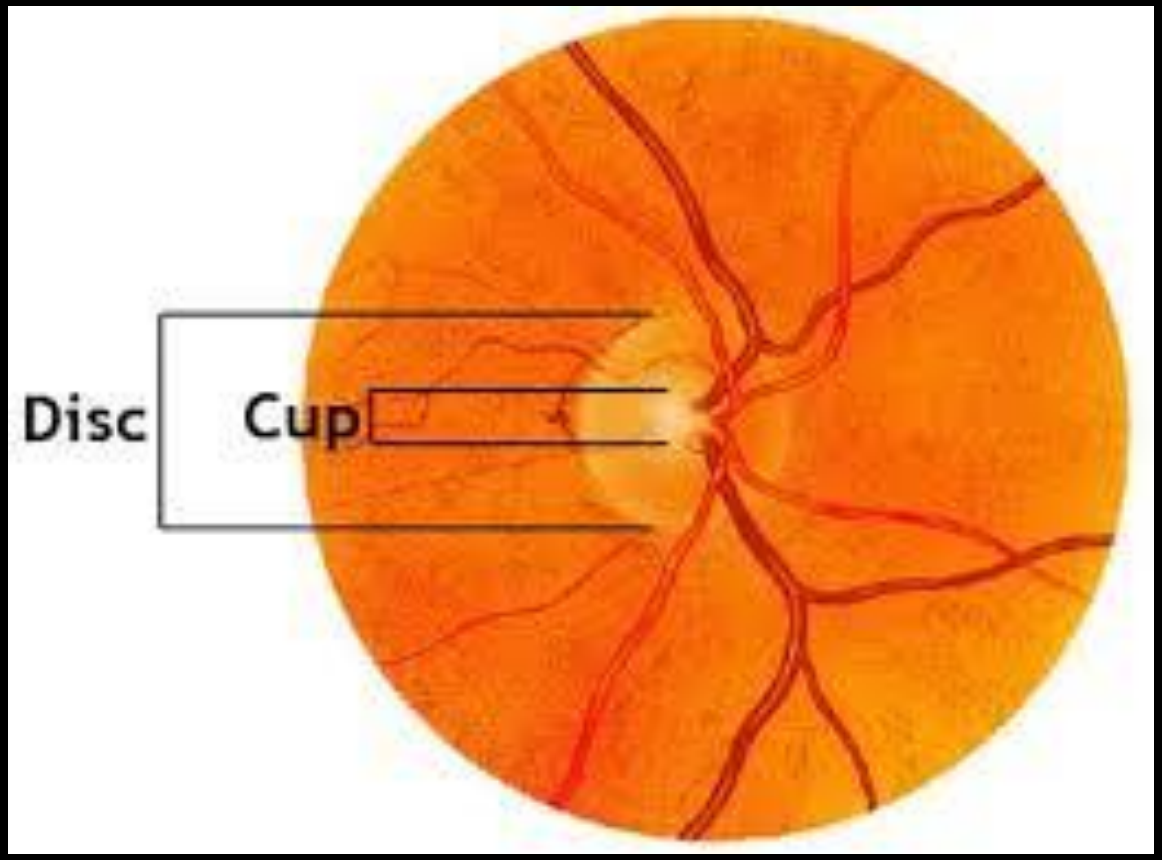
CCT (microns)	IOP (mmHg)	Glaucoma Risk
>555 (thick)	<21 (normal)	average
>555 (thick)	>24 (high)	+
<555 (thin)	<21 (normal)	++
<555 (thin)	>24 (high)	+++++
555 (average)	<21 (normal)	Average
555 (average)	>24 (high)	+++

Monitoring of Glaucoma and OHT

- 1) Intraocular Pressure (IOP)
- 2) Optic Nerve Assessment (“Cupping”)
- 3) Visual Fields

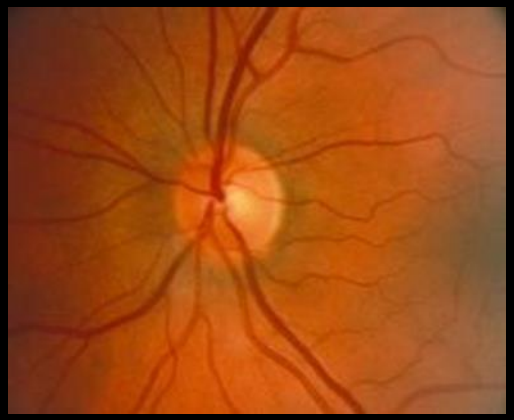
Monitoring of Glaucoma & OHT:

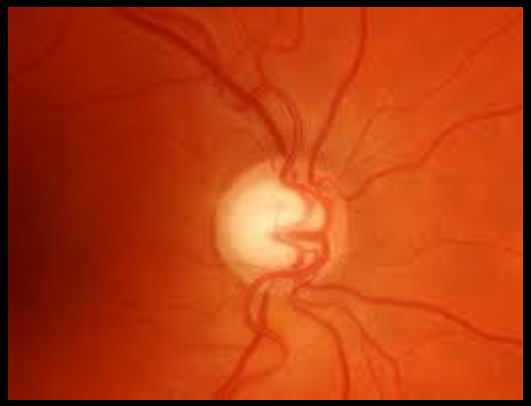
2. Optic Nerve assessment

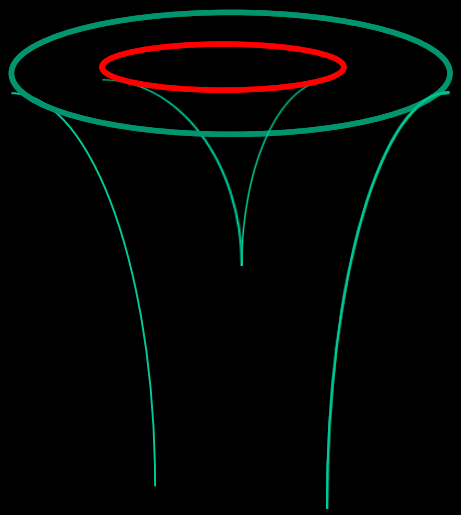


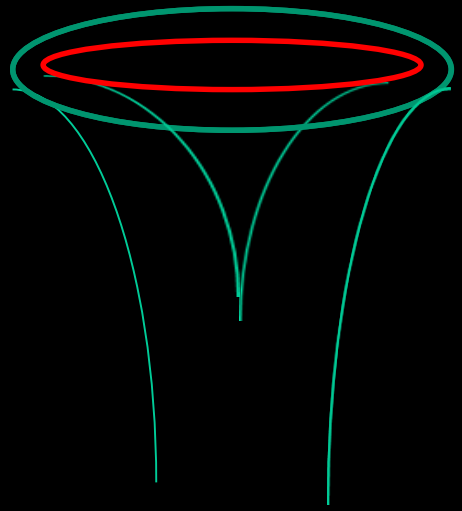
Monitoring of Glaucoma & OHT:

2. Optic Nerve assessment



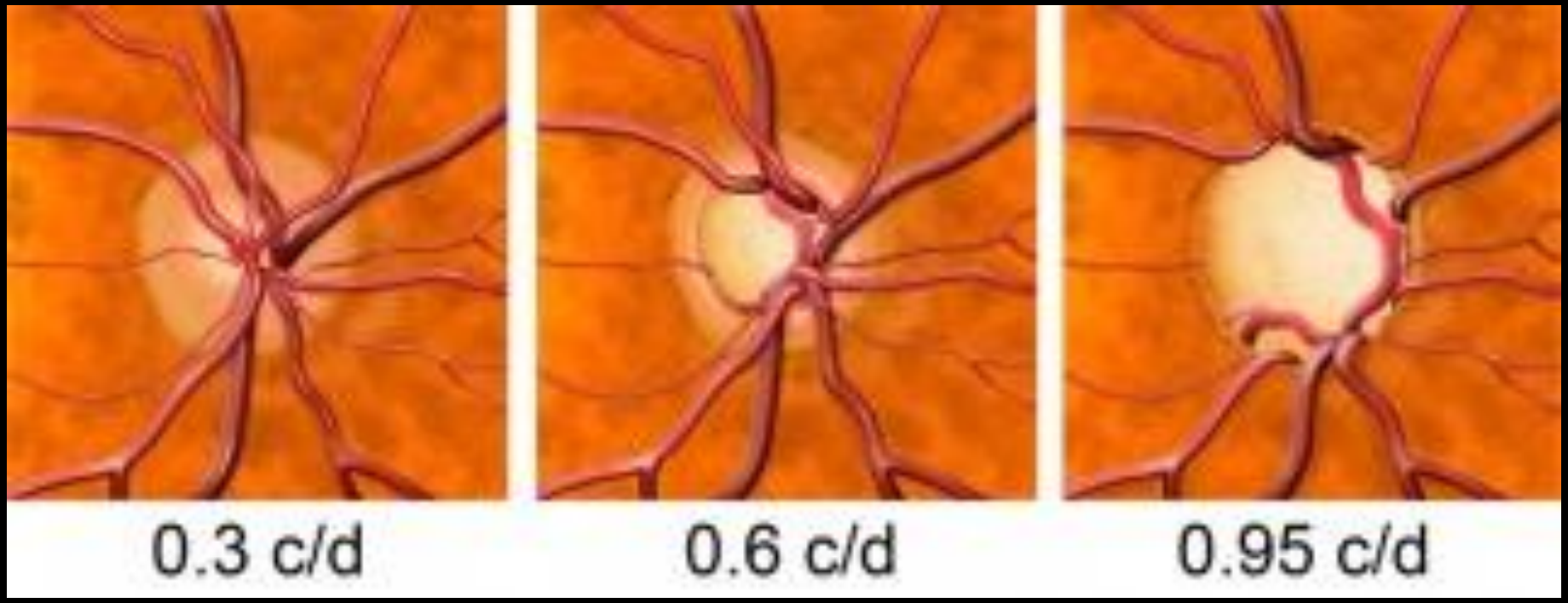






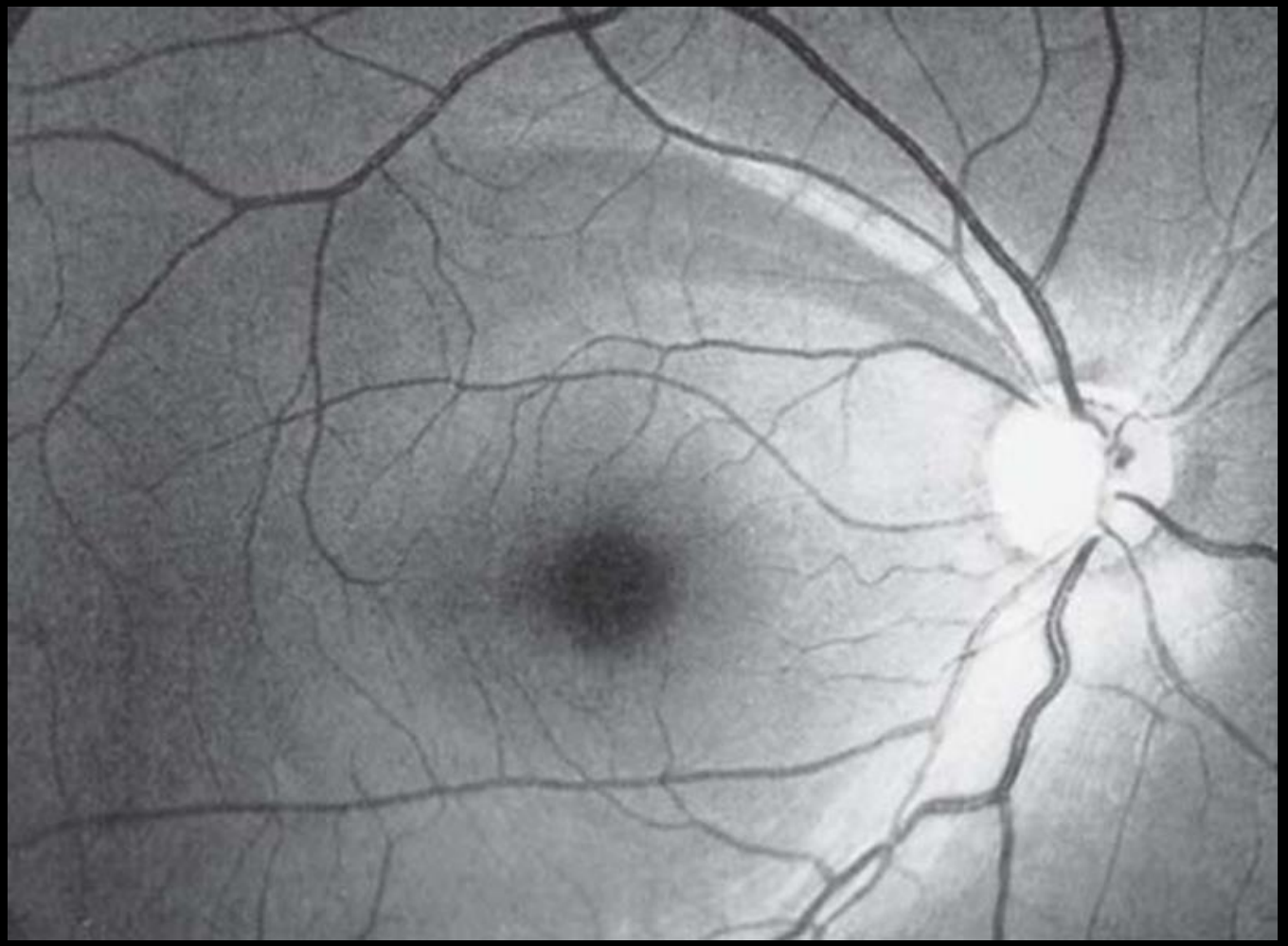
Monitoring of Glaucoma & OHT:

2. Optic Nerve assessment



Disc Haemorrhage

Nerve Fibre layer defect on red free photograph



Monitoring of Glaucoma and OHT

1) Intraocular Pressure (IOP)
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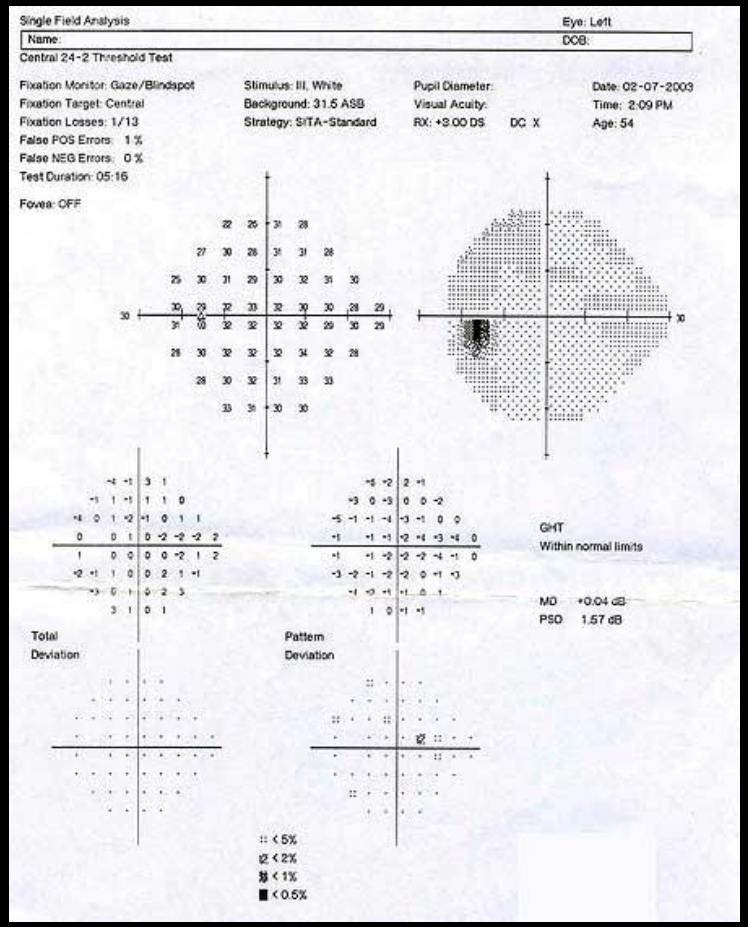
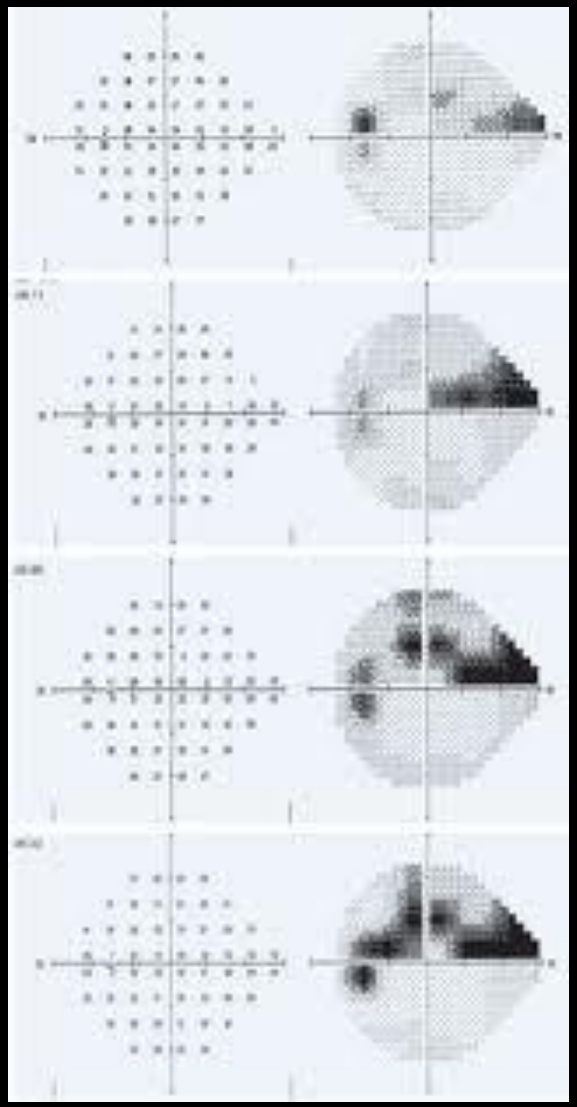
3) Visual Fields

Monitoring of Glaucoma & OHT:

3. Visual Fields



Normal Left Eye



Progressive glaucoma Left Eye

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- **Management & treatment**
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- Future Directions
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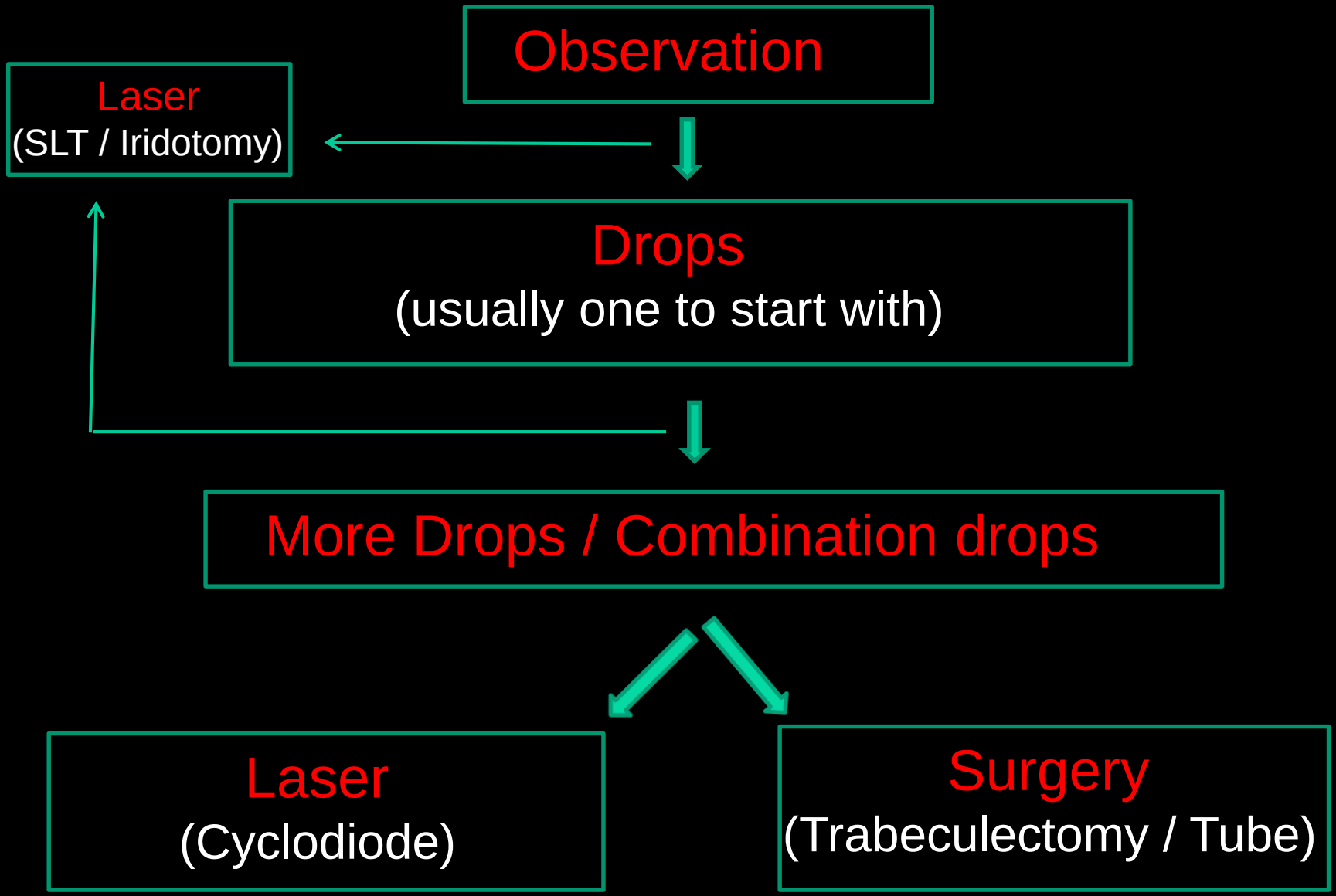
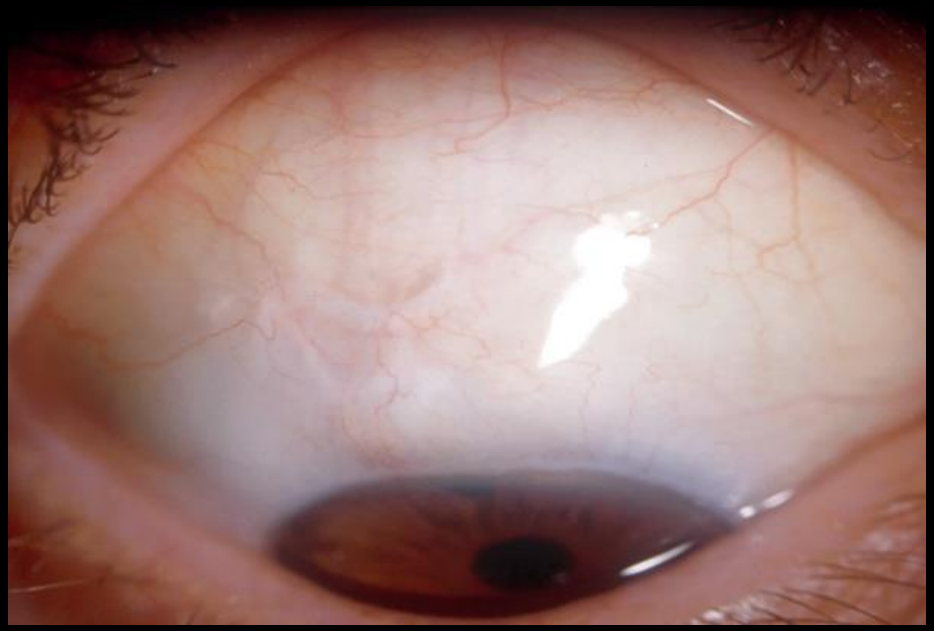
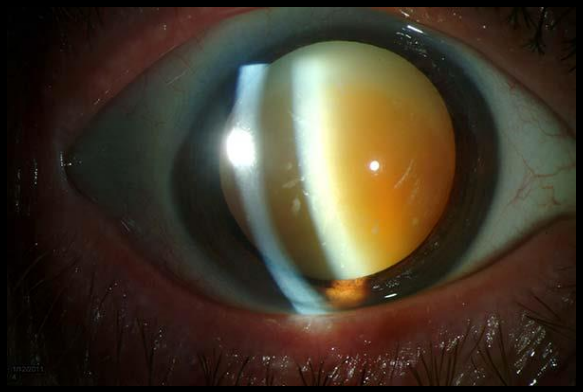
Management Overview



Surgical treatments



Cataract Surgery



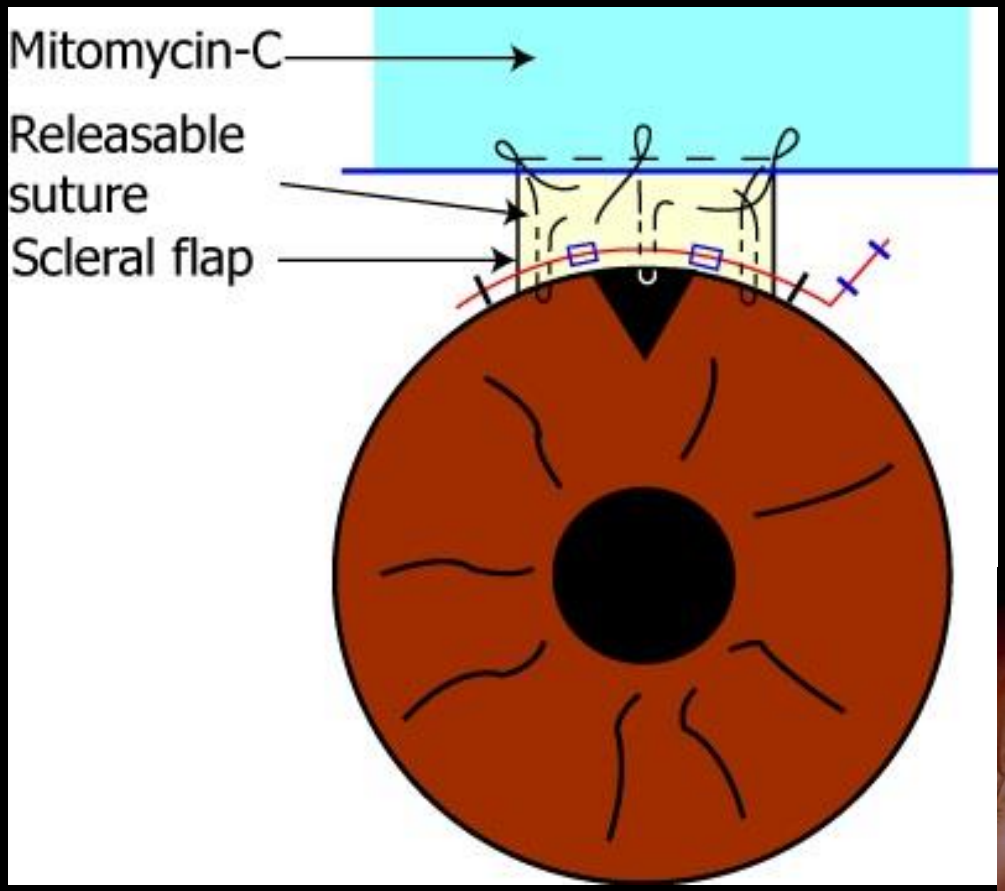
Known to lower eye pressure

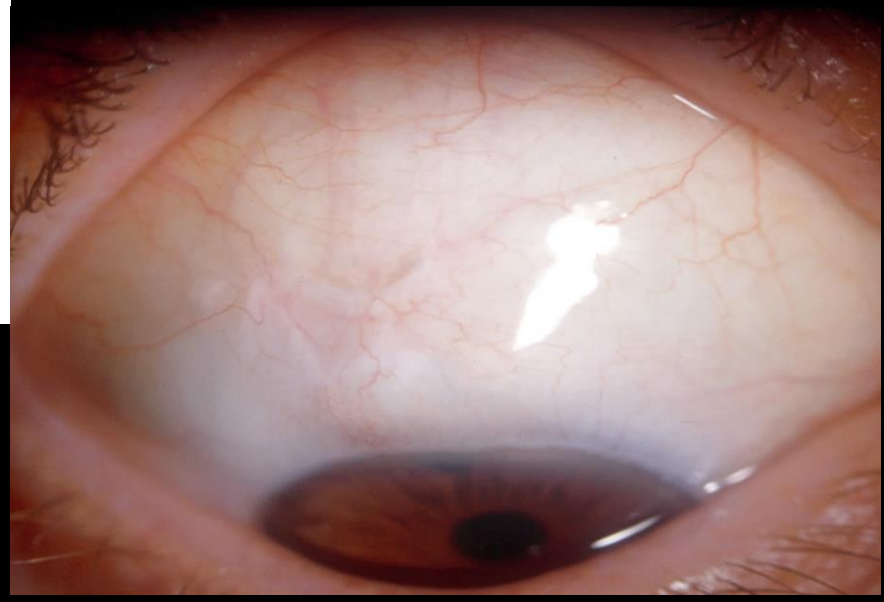
Effect can last 3 years or more

Lens extraction for angle closure / narrow angles

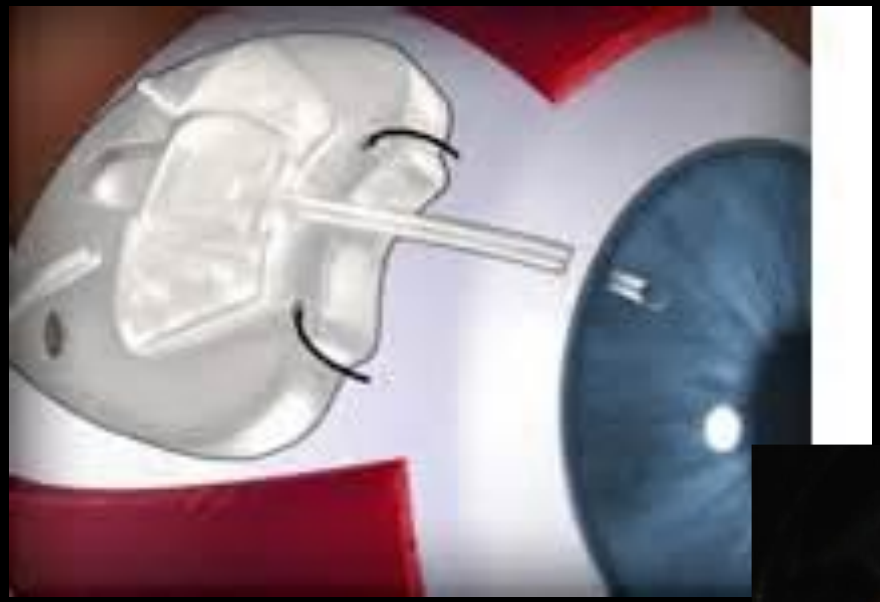
Good first procedure before Trabeculectomy or Tube surgery

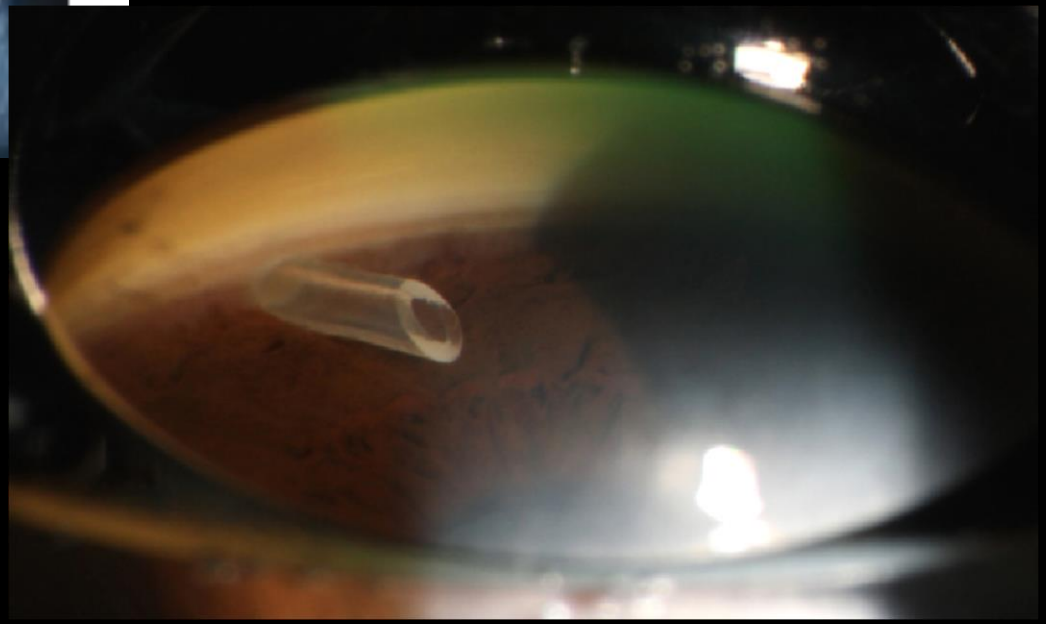
Trabeculectomy





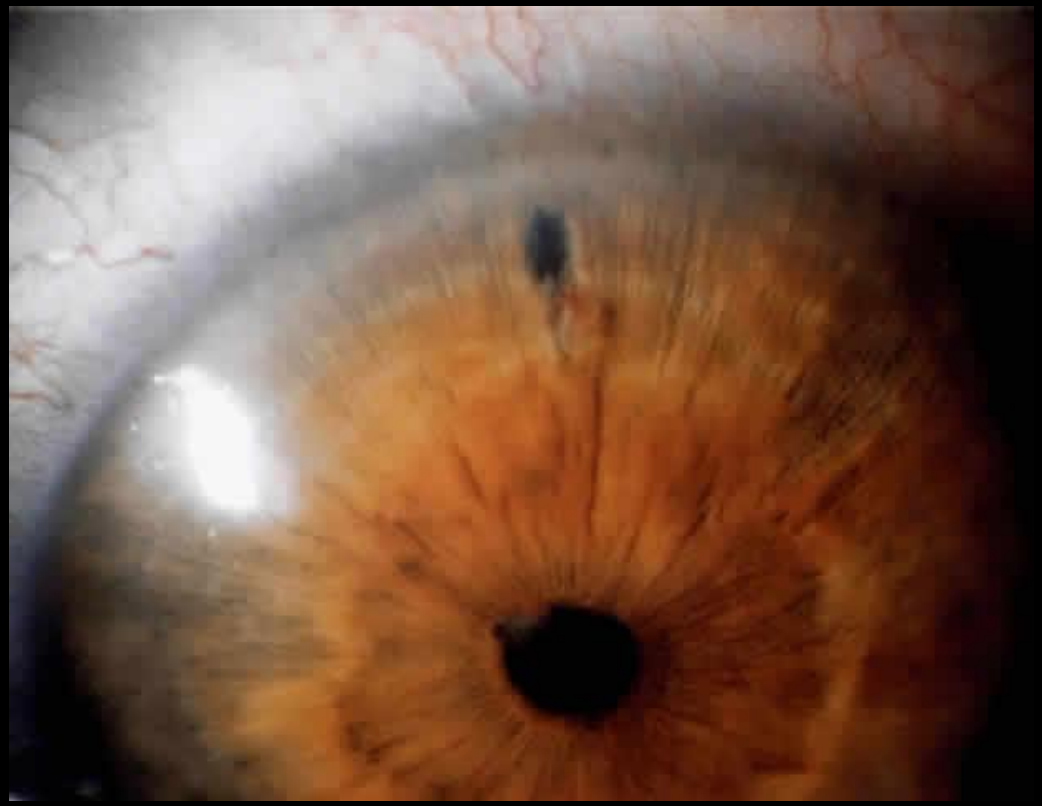
Aqueous Shunt Surgery
(Tube)





Laser Treatments

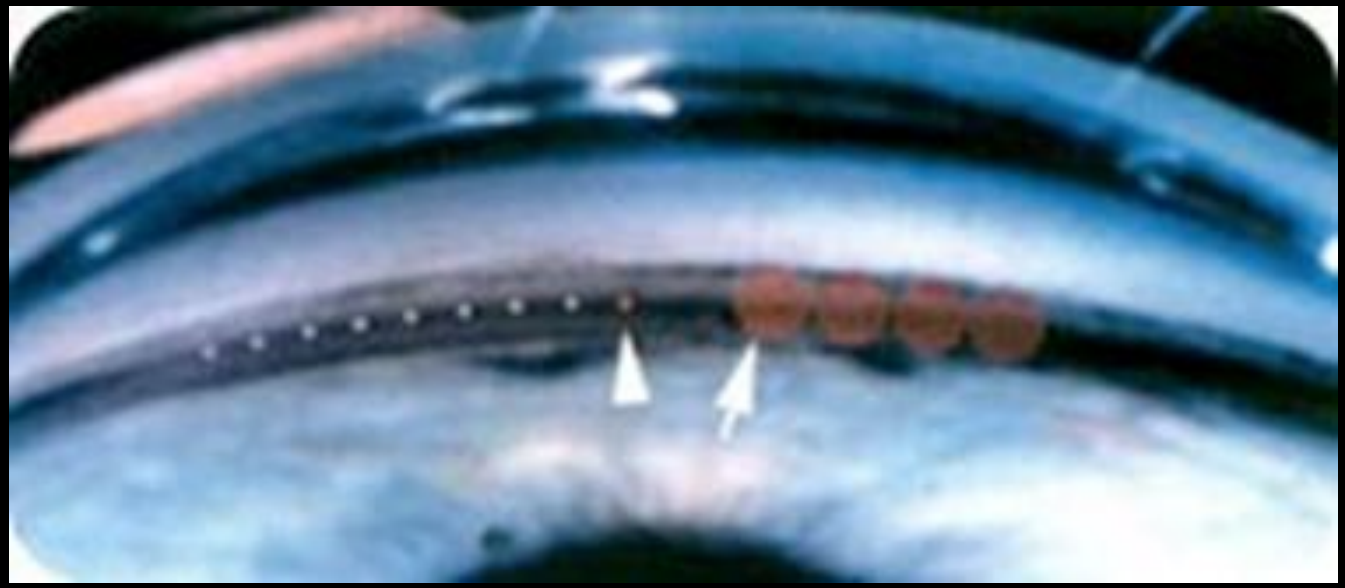
Yag Laser Iridotomy
For closed / narrow drainage angles
Usually both eyes
Clinic procedure



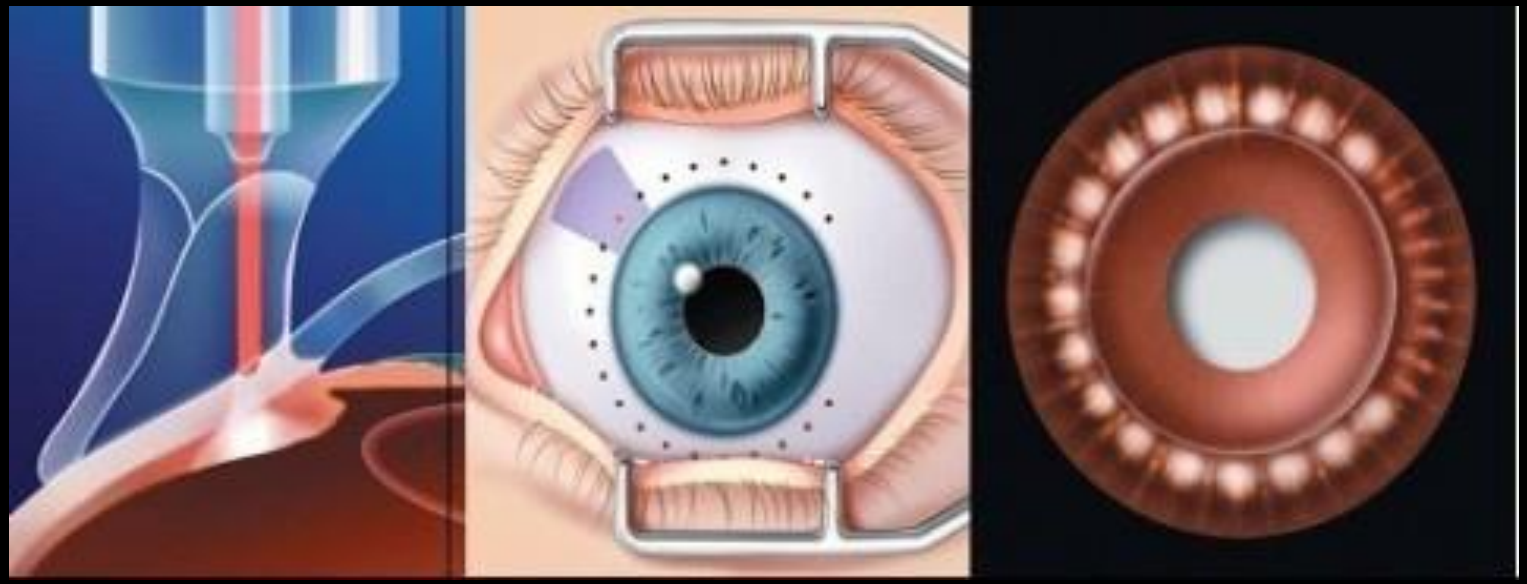
Laser Treatments

ALT
Argon Laser Trabeculoplasty

SLT
Selective laser Trabeculoplasty



Cyclodiode Laser Ciliary Body Photocoagulation



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Glaucoma and Driving

- Only need to inform DVLA if ***both*** eye fields affected
- Not up to me! DVLA decides
- Need horizontal 120^0 with 20^o above and below the horizontal (“letter box”)
- Esterman fields done with both eyes open
- Legal obligation of patient to inform DVLA

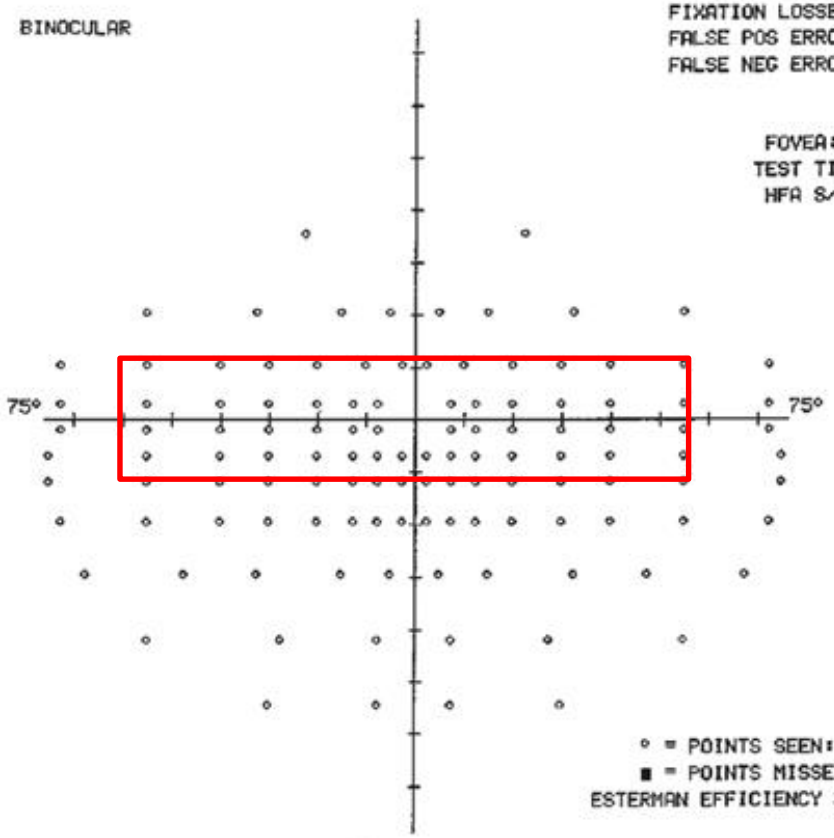
ESTERMAN BINOCULAR FUNCTIONAL TEST

STIMULUS III. WHITE. BCKGND 31.5 ASB NAME
BLIND SPOT CHECK SIZE OFF ID BIRTHDATE
FIXATION TARGET CENTRAL DATE 07-01-94 TIME 09:43:11
STRATEGY SINGLE INTENSITY PUPIL DIAMETER 5.0 MM VA 20/15
STIMULUS INTENSITY 10 DB RX USED +7.0 DS DCX DEG

BINOCULAR

FIXATION LOSSES 0/0
FALSE POS ERRORS 0/9
FALSE NEG ERRORS 0/4

FOVEA: 33 DB
TEST TIME 00:04:35
HFA S/N



° = POINTS SEEN: 120/120
■ = POINTS MISSED: 0/120
ESTERMAN EFFICIENCY SCORE: 100

GRAYTONE SYMBOLS

SYM										
ASB	.8 to .1	2.5 to 1	8 to 3.2	25 to 10	79 to 32	251 to 100	794 to 316	2512 to 1000	7943 to 3162	≥ 10000
DB	41 to 50	36 to 40	31 to 35	26 to 30	21 to 25	16 to 20	11 to 15	6 to 10	1 to 5	≤0

IOL. FEB 24. 1989 MODS.

NAME A.N.Other

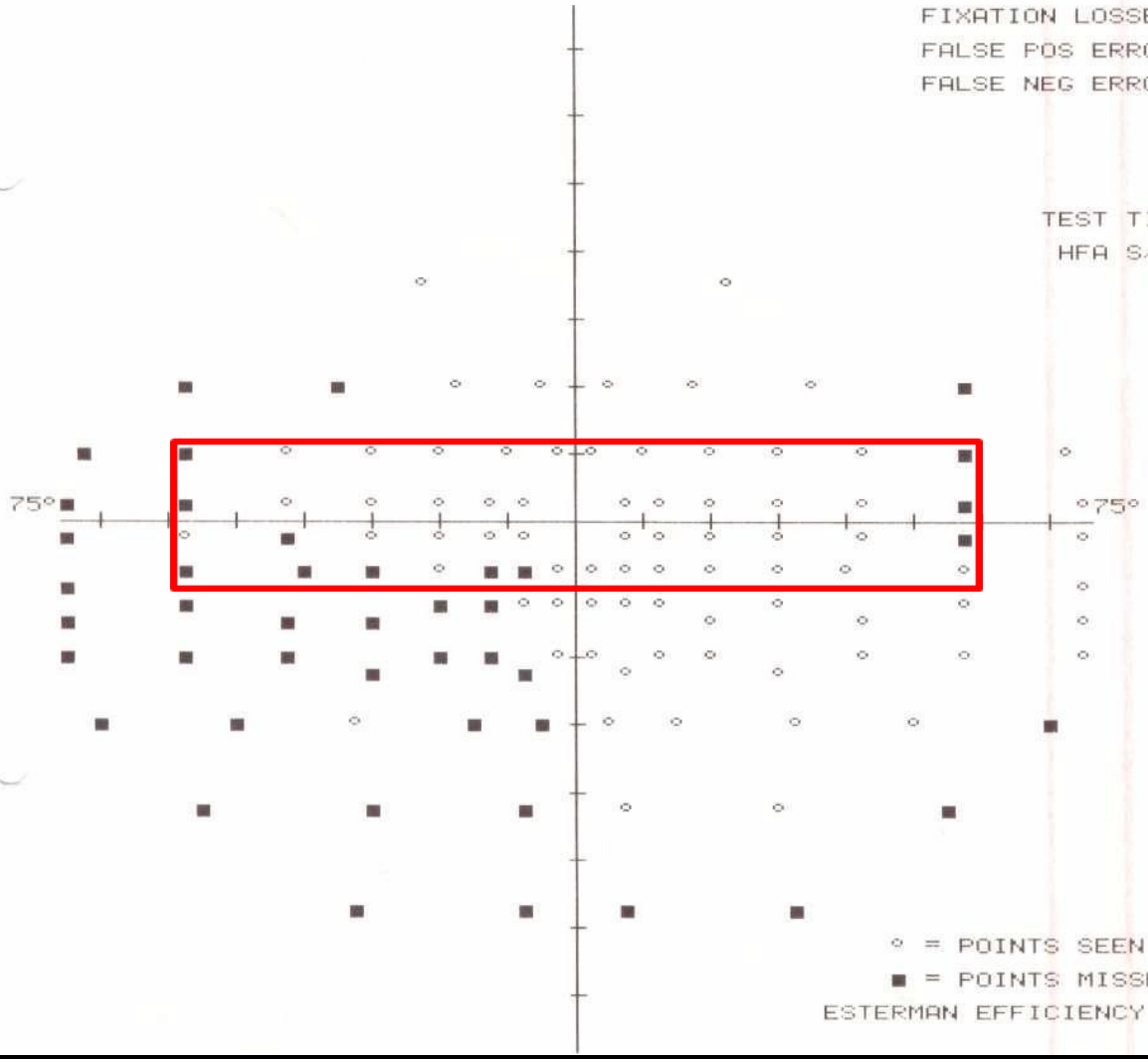
BINOCULAR

STIMULUS III, WHITE, BCKGND 31.5 ASB
BLIND SPOT CHECK SIZE OFF
FIXATION TARGET CENTRAL
STRATEGY SINGLE INTENSITY
STIMULUS INTENSITY 10 DB

ID 168823 BIRTHDATE 04-09-19
DATE 18-02-98 TIME 13:31:13
PUPIL DIAMETER 4.5 MM VA 20/40
RX USED DS DCX DEG

FIXATION LOSSES 0/0
FALSE POS ERRORS 2/9
FALSE NEG ERRORS 0/6

TEST TIME 06:41
HFA S/N 630-7837



° = POINTS SEEN: 76/120
■ = POINTS MISSED: 44/120
ESTERMAN EFFICIENCY SCORE: 63

Driving & Glaucoma

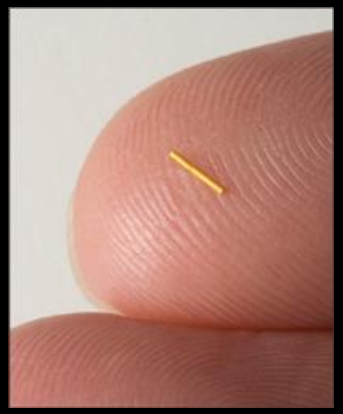
Driving Videos

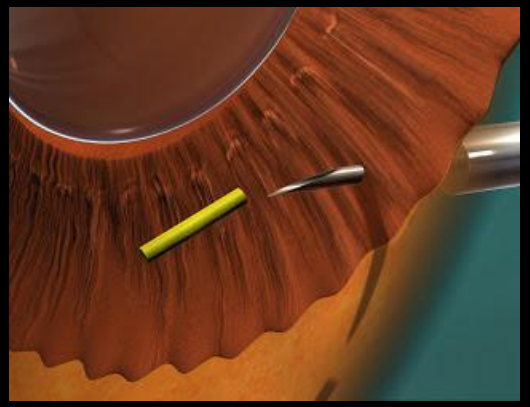
Overview

- Definitions
- Background Statistics
- Monitoring of Glaucoma
- Management & treatment
- Glaucoma and Driving
- Future Directions
- Glaucoma in perspective

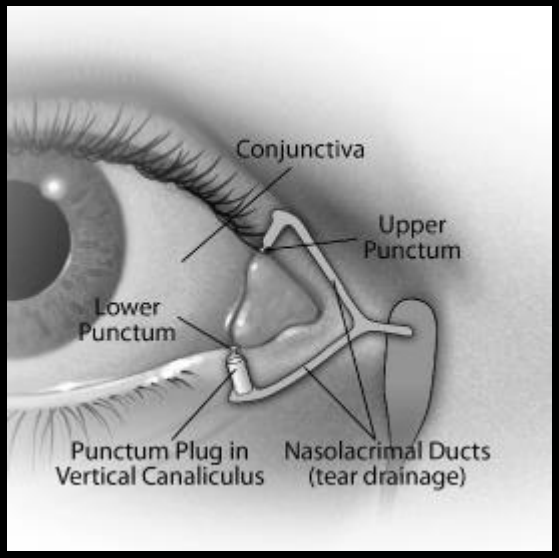
Possible future alternatives to drops

Slow release inserts
(Amorphex TODDD implant)

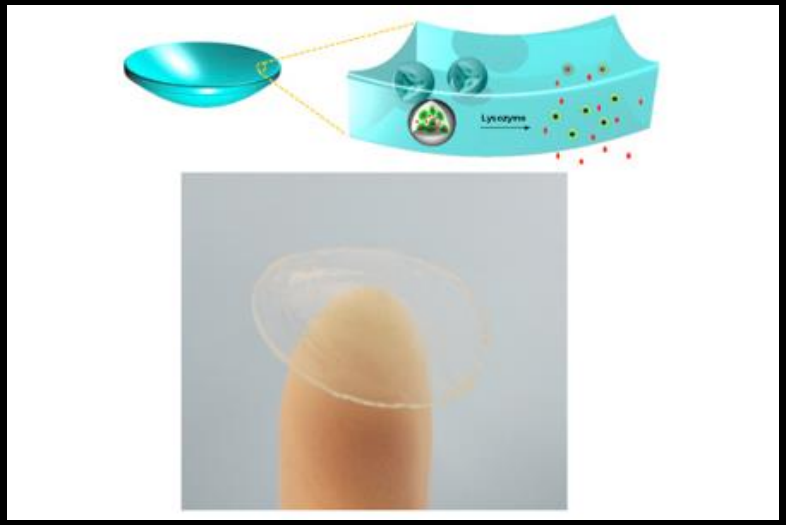




Slow release implants (pSivida, SKS Ocula)



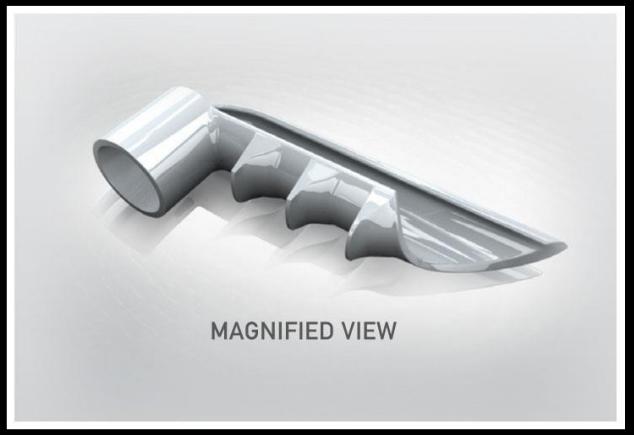
Drug releasing tear duct plugs
(Ocular Therapeutix)

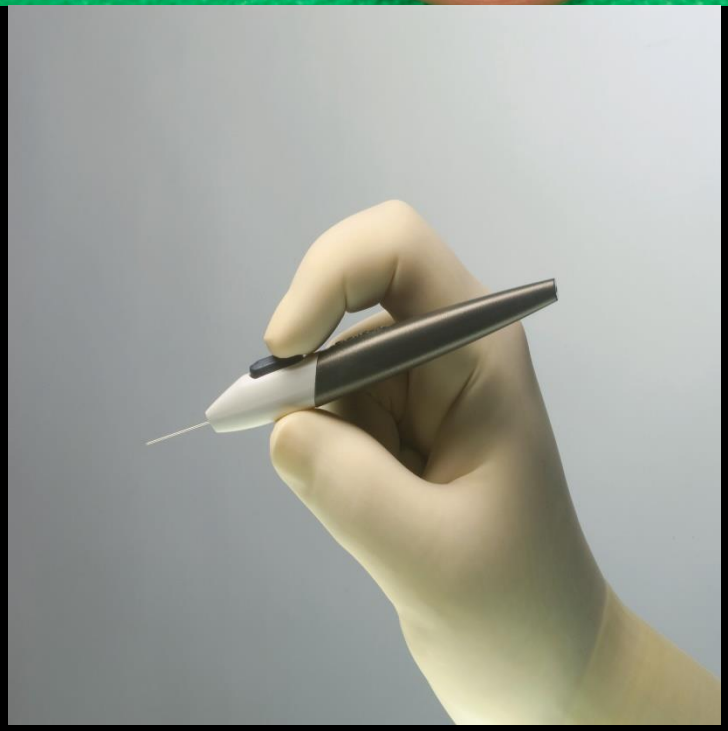


Drug releasing contact lenses
(UCLA)

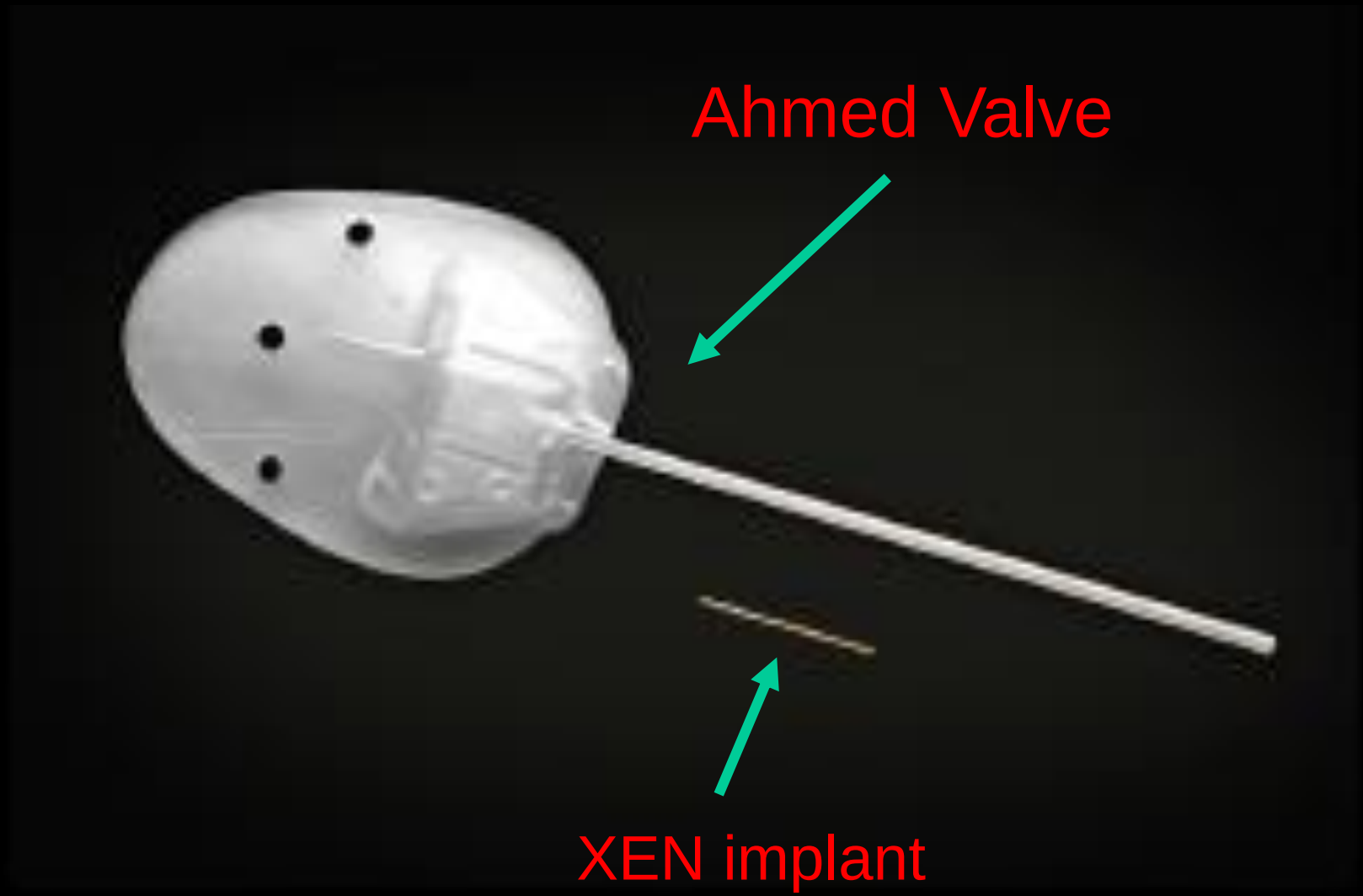
MIGS

(Minimally Invasive Glaucoma Surgery)





Xen Implant


Ahmed Valve
XEN implant

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Estimated Number of People living with Glaucoma

Estimated number of people living with glaucoma

	2015	2020	2025	2030	Percentage change from 2015 to 2030
Milton Keynes	2,360	2,550	2,730	2,890	22%
SOUTH EAST	84,120	88,400	92,750	96,500	15%
ENGLAND	504,650	528,960	554,110	572,860	14%

RNIB Website

Certification of Visual Impairment (CVI) rates

3. Certification

	Total number of CVIs (2013/14)	Rate of certification per 100,000 people (2013/14)	Percentage change in rate since 2012/13	Rate of age related macular degeneration CVIs per 100k people over 65 (2013/14)	Rate of glaucoma CVIs per 100k people over 40 (2013/14)	Rate of diabetic eye disease CVIs per 100k people over 12 (2013/14)
Milton Keynes	32	13	-6%	32	7	0
SOUTH EAST	3,615	41	-1%	123	12	3
ENGLAND	21,910	43	1%	119	13	3

RNIB Website

Perspective

- Glaucoma pick up and management much better in developed world
- Compliance with drops and keeping appointments reduces risk of disease progression
- Rate of absolute blindness from glaucoma thankfully relatively small
- Majority of patients will not lose significant vision in their lifetime

Summary

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Despite all our efforts…..Videos of the real world!

Thank you all for coming today.